3. Birds

3-1 Bald Eagle

3-1.1 Species Name

Haliaeetus leucocephalus

Common Name: Bald eagle

Initial coverage recommendation: Covered

3-1.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE SERVICE)

Threatened (1995) - Originally listed as Endangered under the Endangered Species Preservation Act in 1967

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Threatened

NATURAL HERITAGE PROGRAM GLOBAL RANK

G4

NATURAL HERITAGE PROGRAM STATE RANK

S4B, S4N

3-1.3 Range

Bald eagles are well distributed throughout almost all of North America. They exist in virtually the entire continental United States, including Alaska, Canadian provinces and the northwestern portion of Mexico (Johnsgard 1990). They nest in prominent places overlooking or near water bodies. They are most frequent in winter near coasts or the Mississippi River, and may be locally abundant to prey upon plentiful fish and/or waterfowl.

Nesting bald eagles are much more abundant along the Puget Sound, in coastal areas and the Columbia River estuary than elsewhere in western Washington. In eastern Washington, bald eagle nests are more likely to occur along northeastern waterways

(Stinson et al. 2001), although a few widely scattered nests have been recorded on the east slope of the Cascade Mountains and in the Hanford Reach of the Columbia River (Stinson et al. 2001) (Appendix F). During winter, eagles generally become less abundant in maritime environments and may become locally abundant throughout the state near substantial salmon spawning areas and winter waterfowl concentrations (Fielder and Starkey 1987; Dunwiddie and Kuntz 2001; Stinson et al. 2001).

3-1.4 Habitat Use

Bald eagles nest near large water bodies edged with mature forest (Livingston et al. 1990). They defend territories greater than 10 $kilometers^2$ that support healthy fish populations and are variably intolerant of disturbance (Johnsgard 1990).

NESTING

In western Washington, breeding home ranges encompass an aquatic foraging area centered around a mature or old growth forest stand within 1.6 kilometers of open water and containing one or more trees large enough to support a nest (Garrett et al. 1993; Livingston et al. 1990; Stinson et al. 2001). Home ranges average 6.8 square kilometers (range 0.7 to 79.9 square kilometers), and include foraging and resting perches, as well as sentinel perches near nests and foraging areas (Watson and Pierce 1998). Foraging for mostly birds and fish occurs in lakes, rivers, bays and marine areas (Watson and Pierce 1998). Adults mature at 5 years of age, lay one to two eggs per clutch, and may survive beyond 20 years of age (Buehler 2000). Nest success can vary widely (Buehler 2000).

MIGRATION

Most bald eagles nesting around Puget Sound leave the state in late summer and migrate northward into British Columbia, Canada and as far as southeast Alaska to take advantage of abundant salmon spawning runs, waterfowl concentrations or large mammal carrion (Watson and Pierce 1998). Eagles typically returned to Washington during fall/early winter to reestablish breeding home range boundaries (Watson and Pierce 1998).

WINTERING

Bald eagles congregate near abundant food sources during winter; with roost and perch locations within sight of important food sources (Anthony et al. 1983; Garrett et al. 1993). Large trees with minimal disturbance adjacent to open water with abundant fish and waterfowl are often utilized, and foraging is often from riverbanks and prominent nearby perches. Rivers that support substantial spawning salmon often attract wintering bald eagles (Dunwiddie and Kuntz 2001; Fielder and Starkey 1987).

3-1.5 Population Trends

Bald eagle populations declined drastically during the 1950s mainly due to organochlorine pesticide (dichlorodiphenyltrichloroethane, or DDT) use. In 1973, populations in the southern United States were listed as Endangered, followed by the listing of the entire population in all 48 contiguous states except for Washington, Oregon, Minnesota, Wisconsin and Michigan in 1976. Populations began to recover following the nationwide ban of DDT use in 1972. The number of bald eagles wintering in eastern Washington climbed from 115 in 1974 to 1975, to a high of 235 in 1980 to 1981 (Fielder and Starkey 1987). Productivity increased throughout the 1980s and 1990s, and the population virtually doubled every 7 to 8 years (64 Code of Federal Regulations Part 128, 1999). The bald eagle was reclassified from federally Endangered to Threatened in 1995 (60 Code of Federal Regulations Paet 133, 1995) and is currently under review for delisting (64 Code of Federal Regulations Part 128, 1999).

Statewide nesting surveys were conducted in Washington from 1980 to 1998. During this time, the population increased about 10 percent annually, reaching a peak of 664 pairs (Stinson et al. 2001). Statewide carrying capacity was estimated at 733 pairs, and the decreasing trend in territory occupancy rates may indicate the population is approaching carrying capacity (Stinson et al. 2001).

3-1.6 Assessment of Threats Warranting ESA Protection

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Bald eagles are sensitive to human disturbance, and the effects of disturbance have influenced habitat utilization. Boating, aircraft, recreation and logging activity have been documented as influencing bald eagle behavior, distribution, abundance and habitat use (McGarigal et al. 1991; Skagen et al. 1991; Brown and Stevens 1997; Grubb and Bowerman 1997; Gende et al. 1998; Wood 1999; Rodgers and Schwikert 2003). Nest density also decreases with proximity to clearcut logging (Anthony and Isaacs 1989; Gende et al. 1998).

Human presence related to residential development of shoreline habitat has been a great source of disturbance to nesting bald eagles in western Washington, and pedestrian activity near an active bald eagle nest was noted as the only disturbance that resulted in eagles flushing from the nest (Watson et al. 1999). In studies by Anthony et al. (1983) and Garrett et al. (1993), suitable roosts and perches near commercial, residential and industrial areas were avoided by wintering and breeding bald eagles.

OVER-UTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC, OR EDUCATIONAL PURPOSES

The bald eagle is a national symbol, and utilization of eagles is highly regulated and not known to currently pose a threat to eagle populations. There are no known commercial, recreational, scientific, or educational uses for bald eagles.

DISEASE OR PREDATION

Disease and predation are not known to be threats to bald eagle populations.

ADEQUACY OF EXISTING REGULATORY MECHANISMS

The bald eagle is afforded protection under the Migratory Bird Treaty Act, the Bald Eagle Protection Act and its current Threatened status under the Endangered Species Act. Additionally, Washington bald eagle protection rules require an agreement between landowners and Washington Fish and Wildlife to protect eagle habitat (Stinson et al. 2001). However, this protection is only afforded to occupied habitat. Two thirds of Washington bald eagles nest on private land, and only 10 percent of these are secure without further protection (Stinson et al. 2001), indicating existing regulatory mechanisms may be inadequate for long-term eagle population viability.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Bioaccumulation of environmental contaminants contributed significantly to the population declines that lead to the initial listing of the bald eagle, and this threat continues to effect populations. Elevated dioxins (tetrachlorodibenzo-p-dioxin, or TCDDs), polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), organochlorine, pesticides and mercury found in young and eggs have been linked to depressed productivity (Elliot et al. 1996; Anthony et al. 1993; Elliot and Norstrom 1998; Donaldson et al. 1999). Residual DDT, dichlorodiphenyldichloroethylene (DDE) and PCBs were linked to thin eggshells in the Columbia River estuary (Anthony et al. 1993) and nest failure in New Jersey (Clark et al. 1998).

Bald eagles are also dependent on locally abundant food sources during fall and winter and as a result their distribution and production has been highly influenced by the availability of fish (Watson et al. 1991; Willson and Halupka 1995; Watson and Pierce 1997). In winter, Skagit River bald eagle distribution has been linked to the run size of spawning chum salmon (*Oncorhynchus keta*) (Dunwiddie and Kuntz 2001; Watson and Pierce 2001) and it is believed that prey abundance may be a limiting factor in bald eagle productivity in Hood Canal (Watson and Pierce 1998).

3-1.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Bald eagles are likely to be affected by several activities authorized by Washington DNR on state-owned aquatic lands. Roadways, bridges and docks could reduce foraging habitat and disturb roosting or nesting populations. Stormwater runoff from these structures may increase concentrations of pesticides, fertilizers, heavy metals, salts and petroleum products in the sediments and water column, which directly impacts prey species of bald eagles. Outfalls and discharges associated with aquaculture and industry may cause localized reduction of water quality, which adversely affects the forage fish that comprise much of the bald eagle's diet. Construction and operation of harbors, ports, shipyards, marinas and petroleum and ferry terminals could cause habitat reduction and degradation and increased disturbance, particularly with nesting. These activities could also cause an increased risk of exposure to spilled oil and fuel, which would affect bald eagle survival.

3-1.8 Species Coverage Recommendation and Justification

It is recommended that the bald eagle be designated as a **Covered Species** for the following reasons: 1) The bald eagle is currently listed as Threatened in the conterminous 48 states under the Endangered Species Act. As this status may change during 2005, it may be desirable to revisit the classification of this species following any federal listing status changes; 2) Washington DNR authorized activities have a "high" potential to affect bald eagles; and 3) There is sufficient information available to assess impacts and to develop conservation measures.

3-1.9 References

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3-2 Black Tern

3-2.1 Species Name

Chlidonias niger

Common Name: Black tern

Initial coverage recommendation: Covered

3-2.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE)

Species of Concern

WASHINGTON FISH AND WILDLIFE STATUS

Monitored

NATURAL HERITAGE PROGRAM GLOBAL RANK

G4

NATURAL HERITAGE PROGRAM STATE RANK

S4B, S2N

3-2.3 Range

The breeding range for black terns in North America extends from the northern U.S. through central Canada (Dunn and Agro 1995), with breeding populations concentrated in productive wetlands in the prairies of Alberta, Saskatchewan, Manitoba, the Dakotas and Minnesota (Dunn and Agro 1995).

Within Washington State, the birds breed primarily on the east slope of the Cascade Mountains within the Okanogan, Columbia Plateau, Canadian Rockies and Blue Mountains ecoregions (Smith et al. 1997) (Appendix F). Black terns winter in marine and marine coastal areas of Central America and northern South America on both the Pacific and Caribbean sides (Dunn and Agro 1995). They leave their nest marshes in early August and aggregate on wetland feeding sites for several weeks. Breeders return to the U.S. and Canada by mid-May. Although flocks can reach tens of thousands, migration usually occurs in small flocks and primarily across inland routes (Dunn and Agro 1995).

3-2.4 Habitat Use

Black terns have a life span of approximately 8 years and reach sexual maturity during their second summer.

NESTING

Semicolonial nests (typically 11 to 50 nests) are constructed on floating substrates in shallow freshwater marshes with emergent vegetation including prairie sloughs, lake margins and occasionally river or island edges. Most nests are on semi-permanent ponds. Nesting marshes across North America (usually 20 hectares) are in open or forested lands up to 1,540 meters elevation (Smith et al. 1997; Dunn and Agro 1995). In northeastern Washington, black terns nest in major river valleys and suitable habitats up to 914 meters in elevation (US Fish and Wildlife 1999). In Washington, eggs are typically laid from May to June. Average clutch size is 2.6 (n=2297) (Dunn and Agro 1995). Hatching occurs from late June to late July with most young fledging from mid-July to late August (Dunn and Agro 1995). Nesting adults forage on insects and small freshwater fish (2.5 to 3.0 centimeters). The proportions of insects to fish in the diet vary with availability (Dunn and Agro 1995).

MIGRATION

During fall and spring migration to and from wintering habitats in Central and South America and breeding habitats in North America, black terns use freshwater lakes, rivers and interior wetlands in the U.S. Although they may concentrate in areas with swarming insects, the relative proportion of insects and fish in their diet highly is variable (Dunn and Agro 1995).

3-2.5 Population Trends

The North American Breeding Bird Survey index indicates that throughout its range, nesting black tern populations have followed a continual decreasing trend from the 1960s to the 1990s, which has reduced the total population by 67 percent (Peterjohn and Sauer 1997; Dunn and Agro 1995). A strong positive association between black tern nests and the abundance of ponds in the northern Great Plains indicates that the availability of suitable nesting habitats may have influenced recent population trends (US Fish and Wildlife 1999).

Insufficient information exists to discern trends for the Washington breeding black tern population. Numbers of black terns nesting in the Columbia Basin appeared to decline when invasive plants choked out native emergent vegetation, but then increased in response to vegetation removal (US Fish and Wildlife 1999). Numbers of nesting black terns in Washington increased from the late 1970s to the mid 1990s, following the end of an extended drought (US Fish and Wildlife 1999).

3-2.6 Assessment of Threats Warranting ESA Protection

Threats to black terns presented below are summarized from Dunn and Agro (1995) and US Fish and Wildlife (1999).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Threats include the loss or degradation of wetlands used for breeding and migration as a result of drainage for agriculture and urban/suburban development. The invasive species purple loosestrife (*Lythrum salicaria*) chokes out native emergent vegetation and can form stands too dense for black tern nesting. Pesticides and piscicides used in agricultural, horticultural, or invasive species control impact insects and fish prey items that are important food sources during nesting and migration.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There is no known commercial, recreational, scientific or educational use for black terns.

DISEASE OR PREDATION

Black terns are susceptible to botulism and internal parasites, but these apparently do not cause significant mortality. Nest predation may limit reproductive success with known predators including: great blue heron (*Ardea herodias*), black-crowned night heron (*Nycticorax nycticorax*), great horned owl (*Bubo virginianus*), mink (*Mustela vision*) and Norway rat (*Rattus norvegicus*). Other potential predators include the common raven (*Corvus corax*), raccoon (*Procyon lotor*), muskrat (*Ondatra zibethica*) and long-tailed weasel (*Mustela freneta*).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

Current regulations appear to be adequate for the protection of black terns during the breeding period. Wetland nesting habitats have provided some protection by Section 404 of the Clean Water Act, although these regulations will not prevent all wetland losses. The Wetland Reserve Program offers incentives for the conservation of breeding habitat by providing permanent wetland easements. Current regulations are inadequate for the protection of black terns on their winter range.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Other natural or manmade factors affecting the continued existence of black terns may include: the periodic decline of the pelagic fish forage base in wintering areas compounded by subsequent overharvest; isolation and fragmentation of nesting and migration habitats due to agriculture or development; and, collisions with power lines, towers and wind turbines during migration. In addition, breeding populations are impacted by human recreational activities such as swimming, fishing, birding, boating or canoeing.

3-2.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Black tern breeding relies upon freshwater marshes, which may be altered by a number of activities authorized by Washington DNR. Transportation projects such as roadways, bridges, and docks may result in habitat loss during construction, while stormwater runoff from the structures may increase concentrations of heavy metals, salts and petroleum products in wetlands that are known to degrade habitat. Invasive species control projects may disturb nesting behavior and alter utilized habitat. Navigation improvements involving dredging, filling or other alteration of wetlands may result in increased sedimentation and/or the direct loss of organisms and habitat. Sewage or other wastewater outfalls may cause localized reductions in water quality resulting in increased turbidity, eutrophication, decreased habitat quality, and the potential disturbance of nesting colonies.

3-2.8 Species Coverage Recommendation and Justification

It is recommended that black terns be addressed as a **Covered Species** for the following reasons: 1) Black terns are federally listed as a Species of Concern and a Monitored Species in Washington. However, this review indicates that insufficient information regarding population status and threats is available, or will be available in the foreseeable future to warrant listing as a federal Endangered or Threatened species; 2) Washington DNR authorized activities have a “high” potential to affect black terns; and 3) Sufficient information exists to assess impacts and to develop conservation measures.

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3-3 Common Loon

3-3.1 Species Name

Gavia immer

Common Name: Common loon

Initial coverage recommendation: Covered

3-3.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not Listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Candidate

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S2B, S5N

3-3.3 Range

The breeding range for the common loon extends from Alaska south into Washington and eastward throughout Canada (McIntyre and Barr 1997). The species winters in Pacific coastal waters from the western Aleutian Islands south to Colima, Mexico and from Newfoundland south to Florida and across the Gulf Coast to Veracruz, Mexico (McIntyre and Barr 1997).

Within Washington, common loons nest on lakes and reservoirs in the Okanogan, North Cascades, East Cascades, and Puget Trough ecoregions, while non-nesting birds may be found during the summer throughout the state north of latitude 46º 30’N (Richardson et al. 2000) (Appendix F). Their winter distribution includes coastal and inland marine waters in the Northwest Cascade and Puget Trough ecoregions, with a few birds found on interior reservoirs, rivers and lakes (Richardson et al. 2000).

3-3.4 Habitat Use

Common loons reach sexual maturity between 2 and 3 years of age, reaching up to 9 years in age.

NESTING

Common loons generally nest on clear, oligotrophic lakes with complex rocky shorelines, numerous bays, deep inlets, numerous islands, floating bogs and fish (McIntyre and Barr 1997). In Washington State, common loons have been recorded nesting on lakes and reservoirs ranging from less than 1 to 32 square kilometers and 3 to 91 meters deep. Preferred nesting sites are on island or shoreline edges within 1.5 meters of water, sheltered from winds, and positioned to allow a view of the pairs' territory. Nesting sites usually include screening vegetation (McIntyre and Barr 1997). Common loons often nest on small islands or floating bog mats, but these birds will also use mainland shorelines (Richardson et al. 2000). The species breeds in the summer, with females laying 1 to 3 eggs each year and chicks hatching within 29 days on average. Non-nesting or failed nesting loons are also found within similar habitats during the summer throughout the state north of latitude 46º 30'N (Richardson et al. 2000). Common loons forage primarily on fish between 10 and 70 grams in size, other aquatic vertebrates, some invertebrates and occasionally vegetation (McIntyre and Barr 1997).

MIGRATION

Prior to their migration during April and again in late October to early December, this species aggregates on low-gradient valley rivers and in littoral or limnetic zones of larger lakes and reservoirs. These staging areas are concentrated in habitats that combine abundant food with shelter from wind-generated waves (McIntyre and Barr 1997).

WINTERING

Common loons winter primarily inshore along coastal marine waters, over shoals and in sheltered bays, inlets and channels, with some individuals on fresh water lakes, reservoirs and low-gradient valley rivers. Winter distributions are variable but are related to the abundance of forage fish, stability of the forage base, protection from storm exposure, and turbidity (Spitzer 1995). Adults are flightless during a few weeks in mid-winter (February) and are therefore vulnerable to environmental disturbances (McIntyre and Barr 1997). In Washington, an estimated 2,890 ± 1,278 (95 percent confidence interval) use Puget Sound and the Strait of Juan de Fuca during winter (Richardson et al. 2000).

3-3.5 Population Trends

The worldwide population of common loons is estimated at 500,000 to 700,000, with numbers decreasing across the southern portion of their range during the early to mid-twentieth century and increasing range wide from1969 to 1989 (McIntyre and Barr 1997).

Nest surveys in Washington State documented an average of 3 nests per year during the 1980s and 8 nests per year during the 1990s, but these surveys were not consistent or comprehensive (Richardson et al. 2000). Non-breeding common loons are known from over 140 different locations on lakes, reservoirs and rivers during the summer. Fourteen to 36 loons occurred in the Puget Sound area during July 1992 to 1998 (Richardson et al. 2000), roughly 10 percent of the winter population in Puget Sound. Surveys in Puget Sound indicate that the wintering population was in the low thousands based on counts of 100 to 200 birds/survey in the early 1990s, with an apparent unexplained increase to 375 to 500 birds/survey in the late 1990s (Richardson et al. 2000). Winter surveys in northwestern Washington indicate inconsistent population trends, illustrating either increasing trends of 43 to 64 percent or a decreasing trend of 17 percent from the late 1970s to the early 2000s (Bower 2003).

3-3.6 Assessment of Threats Warranting ESA Protection

Threats to common loons presented below are summarized from McIntyre and Barr (1997), Richardson et al. (2000) and Lewis et al. (1999).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Such threats include the loss or degradation of the following: 1) lake or reservoir shoreline habitats for breeding; 2) coastal areas for wintering; 3) the degradation of nesting habitat due to lake and reservoir water level fluctuations; 4) the reduction or elimination of forage fish and invertebrates due to rotenone used in invasive species management; and 5) habitat degradation from oil and fuel spills in breeding or wintering habitats.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There is no known commercial, recreational, scientific or educational use for common loons.

DISEASE OR PREDATION

Diseases include avian botulism and fungal infections of the respiratory tract. Nest predation occurs in response to disturbance from boaters and fishermen. Predation from the introduction of, or increase in, nest predators such as crows and ravens, gulls, coyotes, raccoons, skunks, mink and weasels and bald eagles is a concern to common loon populations.

ADEQUACY OF EXISTING REGULATORY MECHANISMS

Nest sites are subject to human disturbance from recreational activities and shoreline developments. Oil spills have contributed to mortality during the past 20 years, despite regulations, because common loon nesting habitats are not protected.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Common loons are at risk from entanglement or entrapment and drowning in fish gill nets, and the ingestion of toxicants–lead from fishing gear, mercury and organochlorines.

3-3.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Common loons rely upon freshwater marshes, which may be altered by a number of activities authorized by Washington DNR. Transportation projects such as roadways, bridges, and docks may result in habitat loss during construction, while stormwater runoff from the structures may increase concentrations of heavy metals, salts and petroleum products in wetlands that are known to degrade habitat. Invasive species control projects may disturb nesting behavior and alter utilized habitat. Navigation improvements involving dredging, filling or other alteration of wetlands may result in increased sedimentation and/or the direct loss of organisms and habitat. Sewage or other wastewater outfalls may cause localized reductions in water quality resulting in increased turbidity, eutrophication, decreased habitat quality, and the potential disturbance of nesting.

3-3.8 Species Coverage Recommendation and Justification

It is recommended that common loons be addressed as a **Covered Species** for the following reasons: 1) Although common loons are not federally listed, they are listed as Candidate Species in Washington; 2) Washington DNR authorized activities have a “high” potential to affect common loons; and 3) Sufficient information exists to assess impacts and to develop conservation measures.

3-3.9 References

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3-4 Common Murre

3-4.1 Species Name

Uria aalge

Common Name: Common murre

Two subspecies are recognized in the Pacific Rim: *Uria aalge inornata*, which breeds in North America from Alaska to northwest British Columbia, and *Uria aalge californica*, which breeds in British Columbia south to California (Nettleship 1996). *Uria aalge californica* occurs in Washington.

Initial coverage recommendation: Covered

3-4.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not Listed

WASHINGTON FISH AND WILDLIFE STATUS

Candidate

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S4B, S5N

3-4.3 Range

The common murre is one of the most numerous marine birds in the Northern Hemisphere with populations estimated at 4 to 8 million birds in western North America and a total population of 13 to 21 million birds (Ainley et al. 2002). The species breeds on mainland cliffs and islands along the Bering Sea and Pacific coasts in western North America, from western Alaska south to Monterey County, California. In western North America, common muures winter in coastal shelf waters from the southern extent of the sea ice in the Bering Sea to southern California (Ainley et al. 2002). In eastern North America, common murres breed from Labrador and southeastern Quebec south to Newfoundland, and winter from Newfoundland to Cape Cod, Massachusetts (Ainley et al. 2002).

In Washington, common murres breed on cliffs, rocks, and islands in the Pacific Northwest Coast Ecoregion between Neah Bay and Aberdeen. Five groups of colonies, with a total of over 10,000 nesting birds, are recognized from north to south. The groups are: Tatoosh Island, Carroll-Jagged, Quillayute-Needles, Split-Willoughby and Point Grenville (Warheit and Thompson 2004; Carter et al. 2001; Speich and Wahl 1989). All colonies except Tatoosh Island are part of the U.S. Fish and Wildlife Service National Wildlife Refuge System.

The species is found throughout the year in all marine waters of the state, including the outer coast and Puget Sound (Warheit and Thompson 2004) (Appendix F). Their fall and winter range is essentially the same as their breeding range, but extends further south. Common murres nesting in Oregon move northward into Washington after the breeding season, reaching the outer Strait of Juan de Fuca by late July to early August, where they spend the fall and winter (Thompson 1997).

3-4.4 Habitat Use

NESTING

Common murres are sexually mature between the ages of 4 and 5, with the maximum recorded life being 26 years (Ainley et al. 2002) . Females lay a single egg between March and July (in Washington) on cliff ledges, sloping island surfaces or flat areas on rocky headlands and islands. Incubation typically lasts 4 to 5 weeks and chicks fledge within 4 weeks of hatching. Adults forage in continental shelf and slope waters within a maximum of 70 to 80 kilometers from nesting colonies (Ainley et al. 1990), preying on small fish (2 to 25 centimeters), krill, large copepods and squid (Ainley et al 2002). The species feeds above or on the bottom, at depths of up to 180 meters, using their wings for underwater propulsion (Ainley et al. 2002). From the coast of Washington, fish commonly taken include, Pacific herring (*Clupea pallasi*), Pacific sandlance (*Ammodytes hexapterus*), surf smelt (*Hypomesus pretiosus*), and eulachon (*Thaleichthys pacificus*). Occasionally salmonids (*Onchorynchus* spp.) and rockfish (*Sebastes* spp.) will be taken and rarely, when upwelling predominates, deep-dwelling fish such as lanternfish (Myctophidae) can also comprise a portion of their diet (Ainley et al. 2002, Parrish and Zador 2003).

WINTERING

Large numbers of common murres are present from fall through winter along the Pacific coast. They are often close to shore and in the deeper habitats of inland marine waters, such as inlets and sounds. Washington and Oregon breeders disperse, rear chicks, molt, and winter among sheltered bays and straits, such as the Straits of Juan de Fuca and Georgia, and Puget Sound (Ainley et al. 2002). Common murres often feed on spawning herring and move farther offshore in March when spawning is complete (Ainley et al.

2002). Mid-water crustaceans (krill and amphipods) are more prevalent in winter diets than summer, although these items dominate the diet year-round in pelagic waters (Ainley et al. 2002).

3-4.5 Population Trends

Numbers of nesting common murres in Washington decreased by 32 percent per year from 26,500 pairs in 1979 to 4,000 in 1989 (Carter et al. 2001). Colonies at Split and Willoughby rocks were almost completely abandoned. This decline was precipitated by warm-water events in 1981 and El Niño in 1983 (Ainley and Divoky 2001). At-sea and colony counts of common murres are inversely proportional, so the proportion of breeding birds in the population is an important parameter for interpreting estimates based on colony counts (Ainley et al. 2002). In addition to the colony counts, comparison of long-term aerial and boat-based surveys for common murres wintering in Washington also indicate declines of 38 to 88 percent from 1978 and 1979 to 2003 (Bower 2004). Common murre distribution and abundance varies substantially with season and location on the outer coast. Total at-sea population estimates were consistent in 2001 and 2002 at 73,000 to 74,000 birds, but variability was high (the 95 percent confidence interval included 30 to 50 percent of total estimate) (Warheit and Thompson 2004).

3-4.6 Assessment of Threats Warranting ESA Protection

Threats to common murre presented below are summarized from Ainley et al. (2002) and Warheit and Thompson (2004).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Common murres are sensitive to marine circulation changes (El Niño Southern Oscillation) that result in reduced abundance and quality of prey species.–Due to their gregarious nature and habitat use within shipping channels, common murres are extremely vulnerable to oil spills. In addition, human disturbance (foot, boat, kayak) at nesting colonies can result in lost or reduced breeding success.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There is no known commercial, recreational, scientific or educational use for common murres.

DISEASE OR PREDATION

Although common murres do not appear to be at risk from disease, predation by both bald eagles (*Haliaeetus leucocephalus*) and the introduced Norway rat (*Rattus norvegicus*) may lead to direct and indirect impacts on reproductive success.

ADEQUACY OF EXISTING REGULATORY MECHANISMS

Colonies are protected because they are located within marine sanctuaries, but are still subject to human disturbance and oil spills. Existing regulatory mechanisms may be inadequate because they may not be able to prevent disturbance to the colonies, and although the risk of oil spills has been reduced, it has not been eliminated.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

An additional factor that may effect this species includes global marine climate change and reduced marine productivity in waters adjacent to breeding colonies. Furthermore, the unintended capture of common murres by longline and gill-net fisheries can result in entanglement and drowning which may negatively impact populations.

3-4.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Common murres are likely to be affected by activities authorized by Washington DNR on state-owned aquatic lands. Overwater structures such as log booms/rafts, floats, docks/wharves and breakwaters may reduce foraging areas. Roadways, bridges, and docks could reduce habitat and disturb wintering, brood-rearing and potentially nesting populations. Outfalls and discharges associated with aquaculture and industry may cause localized reduction of water quality, which adversely affects forage fish that comprise a large part of the common murre's diet. In addition, aquaculture may cause habitat degradation and a reduction in forage availability resulting in displacement. Nearshore activities such as sand and gravel mining, dredging and dredge disposal may cause increased sedimentation and/or the direct loss of important prey species. Construction and operation of harbors, ports, shipyards, marinas, petroleum and ferry terminals could cause habitat reduction and degradation and increased disturbance as well as cause an increased risk of exposure to spilled oil and fuel, which would affect common murre productivity and survival.

3-4.8 Species Coverage Recommendation and Justification

It is recommended that common murres be addressed as **Covered Species** for the following reasons: 1) Common murres are listed as a Candidate Species in the state of Washington; 2) Washington DNR authorized activities have a "high" potential to affect common murres; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

3-4.9 References

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3-5 Harlequin Duck

3-5.1 Species Name

Histrionicus histrionicus

Common Name: Harlequin duck

Initial coverage recommendation: Evaluation

3-5.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not Listed

WASHINGTON FISH AND WILDLIFE STATUS

Species of Concern

NATURAL HERITAGE PROGRAM GLOBAL RANK

G4

NATURAL HERITAGE PROGRAM STATE RANK

S2B, S3N

3-5.3 Range

There are two separate breeding ranges for harlequin ducks in North America - western North America, from the Brooks Range in Alaska south to Oregon, and inland to Wyoming; and eastern North America, in Labrador, Newfoundland and Quebec. Wintering harlequin ducks use the Pacific coast from the Aleutian Islands in Alaska to Northern California and the Atlantic coast from Newfoundland south to Massachusetts.

Within Washington, an estimated 400 harlequin duck pairs nest on fast-flowing streams of inland watersheds or estuarine sites (Robertson and Goudie 1999) (Appendix F). Nesting birds are found throughout the Olympic and Cascade Ranges, the Pacific Northwest Coast and in northeastern Washington. Although there are questions surrounding the observances, they may also occur in the southeastern corner of

Washington in the Blue Mountains ecoregion (Lewis and Kraege 2004). An estimated 3,000 harlequin ducks winter in northern Puget Sound, northern Hood Canal, the Strait of Juan de Fuca, San Juan Islands and along the outer coast (Robertson and Goudie 1999; Lewis and Kraege 2004). Many birds that nest in Washington, molt and winter in the Strait of Georgia, British Columbia, while some harlequins that molt and winter in Washington nest in interior British Columbia, Alberta, Idaho, Wyoming and Montana (Smith and Smith 2003; Lewis and Kraege 2004).

3-5.4 Habitat Use

NESTING

Harlequin ducks have a life span of approximately 10 years (Robertson and Goudie 1999) and reach reproductive maturity at between the ages of 2 and 3 for females and males respectively. Females typically lay between 5 and 7 eggs in the spring and independently incubate them for 27 to 30 days (Seattle Audubon 2002). Harlequin ducks generally nest during mid April through August on the ground along fast-flowing streams in riparian, sub-alpine or coastal habitats with cobble to boulder size substrate and vegetated banks (Robertson and Goudie 1999; Lewis and Kraege 2004). Preferred habitat includes streams with low acidity, high invertebrate density, steep banks, vegetation cover along stream banks, with braided channels and small islands and gravel and sand bars (Robertson and Goudie 1999). Pairs may also use lakes, offshore islands and mainland coasts, as well as nesting in tree cavities and cliff faces (Robertson and Goudie 1999). Within several weeks after hatch, hens with broods move to low-gradient streams with adequate supplies of aquatic insect larvae (Roberton and Goudie 1999, Lewis and Kraege 2004). Harlequin ducks are attracted to areas with high prey densities, such as lake outlets, and streams where trout, salmon and suckers lay eggs. They feed on larval and adult midges (Chironomidae), black flies (Simuliidae), caddis flies (Tricoptera), stone flies (Plecoptera), and mayflies (Ephemeroptera) and on fish roe (Robertson and Goudie 1999).

MIGRATION

Prior to spring migration (mid-March through May), many harlequin ducks aggregate at Pacific herring (*Clupea pallasi*) spawning locations (Vermeer et al. 1997), although it is unclear if these aggregations are pre-migratory staging or simply a response to an abundant food source. Harlequin ducks aggregate along banks or near gravel bars of low-gradient valley rivers before they move upstream to riffle-pool reaches to nest (Robertson and Goudie 1999). Fall migration occurs from late June through mid September.

WINTERING

In Washington, harlequin ducks are found in shallow (1 meter) water usually over eelgrass (*Zostera* spp.) and kelp communities and occasionally over sandy beaches or mudflats. Winter distributions are variable but are related to the abundance of available intertidal and subtidal invertebrate forage species with crustaceans (*Hemigrapsus* and *Pagarus*), amphipods, isopods (*Idotea* spp.) and barnacles (*Balanus* spp.) as the most plentiful food items. This species will also forage on molluscs such as snails (*Lacuna* spp.), periwinkles (*Littorina* spp), limpets (*Collisella* spp. and *Notocmaea* spp.), chitons (*Tonicella* spp. *Mopalia* spp.), blue mussel (*Mytilus edulis*) and fish such as small sculpins (Cottidae) and gunnels (Pholidae) (Gaines and Fitzner 1987, Vermeer 1983). Males and non-breeding females are flightless during late July to mid August and breeding females are flightless during September with some breeding females molting as late as October and early November (Robertson and Goudie 1999).

3-5.5 Population Trends

In western North America, the upward estimate for the population of harlequin ducks, based on numbers wintering in the Strait of Georgia, Washington, Prince Williams Sound and the Aleutian Islands, Alaska is approximately 206,000 birds (Robertson and Goudie 1999). While wintering populations in the Strait of Georgia may have declined since 1994 (Robertson and Goudie 1999; Smith and Smith 2003), winter surveys in northwestern Washington indicate an increasing population trend from the late 1970s to the early 2000s (Bower 2003).

3-5.6 Assessment of Threats Warranting ESA Protection

The threats to harlequin ducks presented below are summarized from Robertson and Goudie (1999) and Lewis and Kraege (2004).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Threats include: 1) the loss or degradation of stream habitats for breeding and coastal areas for molting and wintering; 2) degradation of nesting habitat due to logging and mining activities; 3) reduction of invertebrate forage in nesting habitats due to habitat degradation from altered stream flows and silt deposition; 4) reduction in invertebrate abundance in nesting habitats due to rotenone used in invasive species management; 5) disturbance in nesting and brood-rearing habitats from fishing, boating, rafting and research activities; 6) molting and wintering habitat degradation from shoreline development, aquaculture, algae-harvesting and oil and fuel spills; and 7) disturbance in molting and wintering habitats due to boat traffic.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

This species may be unsustainably harvested through sport or subsistence hunting.

DISEASE OR PREDATION

Harlequin ducks are likely susceptible to diseases afflicting other sea ducks. Nest predation occurs, particularly in response to disturbance from boaters and fishermen.

Predation occurs on adults, eggs and young, especially females and ducklings, by bald eagles (*Haliaeetus leucocephalus*), common ravens (*Corvus corax*), hawks (*Buteo* spp.), great horned owls (*Bubo virginianus*), river otters (*Lutra canadensis*), mink (*Mustela vision*) and martin (*Martes americana*).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

Harlequin duck nesting habitats are protected by their status as a Priority Habitat Species in Washington, but because females and young show fidelity to nesting sites, the species may not re-colonize restored habitats. Harlequin ducks consistently use the same molting locations, which may also be protected due to their Priority Habitat Species status. However, the location and level of use for molting areas may not be well described. Existing regulatory mechanisms may be inadequate to protect the species.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Other factors include ingestion of plastics; bioaccumulation of heavy metals and polycyclic aromatic hydrocarbons from creosote piers and/or diesel soot; contaminated food supplies leading to reduced survival and reproduction; and losses due to entanglement or entrapment and drowning in fish gill-nets.

3-5.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Harlequin ducks rely upon riverine, estuarine, and marine habitats which may be altered by a number of activities authorized by Washington DNR. Transportation projects such as roadways, bridges, and docks may result in habitat loss during construction, while stormwater runoff from the structures may increase concentrations of heavy metals, salts and petroleum products in wetlands that are known to degrade habitat. Invasive species control projects may disturb nesting behavior and alter utilized habitat. Navigation improvements involving dredging, filling or other alteration of wetlands may result in increased sedimentation and/or the direct loss of organisms and habitat. Sewage or other wastewater outfalls may cause localized reductions in water quality resulting in increased turbidity, eutrophication, decreased habitat quality, and the potential disturbance of nesting. Construction and operation of harbors, ports, shipyards, marinas, petroleum and ferry terminals could cause habitat reduction and degradation, increased disturbance and increased risk of exposure to spilled oil and fuel, which would affect harlequin ducks survival and productivity.

3-5.8 Species Coverage Recommendation and Justification

It is recommended that harlequin ducks be addressed as a **Covered Species** for the following reasons: 1) Although harlequin ducks lack federal protection status they are listed as a Species of Concern in Washington; 2) Washington DNR authorized activities have a “high” potential to affect harlequin ducks; and 3) Sufficient information exists to assess impacts and to develop conservation measures.

3-5.9 References

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3-6 Marbled Murrelet

3-6.1 Species Name

Brachyramphus marmoratus

Common Name: Marbled murrelet

Initial coverage recommendation: Covered

3-6.2 Status and Rank

Status and Rank: See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE)

Threatened (1992)

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Threatened

NATURAL HERITAGE PROGRAM GLOBAL RANK

G3, G4

NATURAL HERITAGE PROGRAM STATE RANK

S3

3-6.3 Range

An estimated 300,000 marbled murrelets range from the Aleutian Islands in Alaska to central California, where they nest on the ground or in old-growth or mature trees generally within 80 kilometers of the coast (Nelson 1997). About 90 percent of the marbled murrelet population occurs in Alaska, with the remaining 10 percent in British Columbia (6.5 percent), Washington (0.8 percent), Oregon (1.9 percent) and California (0.8 percent) (Nelson 1997). Ground nesting occurs primarily from the Aleutian Islands to Kodiak Island in Alaska, with murrelets nesting mainly in trees from Kodiak Island to the southern extent of their range in California (Nelson 1997). Breeding and non-breeding birds use coastal marine waters for foraging and may be found within 5 kilometers of the shoreline (Nelson 1997).

In Washington, the birds mainly occur in northern Puget Sound and the northern Pacific Coast (Speich and Wahl 1995). A figure representing observations of marbled murrelets, designated critical habitats, and predicted nesting areas in Washington may be found in Appendix F. At-sea distributions are both temporally and spatially variable, with a general eastward shift in abundance from the Strait of Juan de Fuca to Puget Sound and the San Juan Islands during the fall and winter, with British Columbia populations moving south to Puget Sound (Speich and Wahl 1995). Abundance decreases with increasing distance from the shoreline and there is a tendency for juvenile birds to remain closer to shore than adults (Speich and Wahl 1995).

3-6.4 Habitat Use

NESTING

In Washington marbled murrelets nest primarily in Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*) and Sitka spruce (*Picea sitchensis*) trees greater than 76 centimeters in diameter at breast height (US Fish and Wildlife 1997). Nests found in Washington were generally 34 meters above the ground on a 29 centimeter diameter limb of a large (60 meter tall, 150 centimeter diameter at breast height) conifer tree with two landing pads and 60 percent moss cover (US Fish and Wildlife 1997). The average age of forest stands supporting marbled murrelet nests in the Pacific Northwest was 522 years (US Fish and Wildlife 1997). Stands were generally 206 hectares, low elevation conifers, 324 trees per hectare with multiple canopy layers and snags (US Fish and Wildlife 1997).

Critical nesting habitat units contain two primary constituent elements: 1) individual trees with potential nesting platforms; and 2) forested areas within 0.8 kilometers of individual trees with potential nesting platforms, and a canopy height of at least one-half the site-potential tree height (US Fish and Wildlife 1997). Although no marine habitats have been designated as critical, marbled murrelets spend most of their lives in the marine environment, generally within about 2 kilometers of the shoreline (US Fish and Wildlife 1997).

Marbled murrelets reach sexual maturity at 2 years and breed in the early spring. Most eggs are laid between April and July. Females lay only one egg that is incubated for approximately 30 days by both adults (US Fish and Wildlife 1997). During the breeding season, small schooling fish such as Pacific sandlance (*Ammodytes hexapterus*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasi*), surf smelt (*Hypomesus pretiosus*) and shiner perch (*Cymatogaster aggregata*) are consumed (Nelson 1997). Additionally they feed on rockfish (Sebastes spp.) and a host of marine invertebrates such as squid and shrimp. They may also feed on salmon (*Onchorhynchus* spp.) in freshwater lakes during the summer (Nelson 1997). Distribution and abundance during foraging may be influenced by distance from the nest (usually <20 kilometers) as well as physical and biological processes related to prey concentration such as upwelling, outflow of large rivers, shelves at mouths of inlets, shallow banks, rip currents, tidal eddies and kelp beds (Nelson 1997).

Marbled murrelets generally forage in protected coastal and nearshore waters including bays, inlets, fjords, lagoons and coves with most birds diving within 50 meters of the water surface 2 to 5 kilometers from shore (Thomson 1997) and may aggregate where Pacific herring are spawning (Speich and Wahl 1989).

WINTERING

Generally, marbled murrelets move from the outer coastal areas to protected waters such as Puget Sound during winter (Nelson 1997). During winter, the birds are distributed farther from shore in the Strait of Juan de Fuca and long the outer coast, but they are also more abundant (Thompson 1997). Dominant winter prey includes euphausiids (*Thysanoessa* spp., *Euphausia pacifica* (krill)), mysids (*Achanthomysis* spp., *Neomysis* spp.), gammarid amphipods (*Atylus tridens*), smelt and herring, but marbled murrelets also feed on rockfish (*Sebastes* spp), squid and shrimp (Nelson 1997). Marbled murrelets may also occur on freshwater lakes during winter, where they feed on salmonids (Nelson 1997).

3-6.5 Population Trends

Although marbled murrelets were considered common or abundant throughout Washington, Oregon and California during the early 1900s, they are now rare (Nelson 1997; US Fish and Wildlife 1997, 2004). Marine surveys from 1972 to 1993 indicate a population decline on the order of 4 percent per year in Washington (Speich and Wahl 1995), while surveys from 1996 to 1999 indicate no evidence of change (US Fish and Wildlife 2004). Populations in Washington appeared to increase during 2000, 2001 and 2002, but survey variability was high and trends are not significant (Huff 2003). Low reproduction rates across Washington, Oregon and California, as measured by nest success and the ratio of juveniles to adults, indicate that the marbled murrelet population in these areas is not reproductively stable (US Fish and Wildlife 2004).

3-6.6 Assessment of Threats Warranting ESA Protection

Threats to marbled murrelets and designated critical nesting habitat presented below are summarized from US Fish and Wildlife (2004), McShane et al. (2004), Nelson (1997) and US Fish and Wildlife (1997).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Harvest of old-growth forests in the Washington, Oregon and California range of the marbled murrelet is the main cause of population decline. While the rate of annual habitat loss has declined, however the historic loss and modification of habitat has not been offset by the development of new habitat.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There is no known commercial, recreational, scientific or educational use for marbled murrelets.

DISEASE OR PREDATION

Nest failure rates due to predation are 68 to 100 percent and key factors related to nest failure include proximity to humans, abundance of avian predators, and proximity and type of forest edge. Nest predators take both eggs and chicks and include common ravens (*Corvus corax*), common crows (*Corvus brachyrynchos*), Steller's jays (*Cyanocitta stelleri*), gray jays (*Perisoreus canadensis*) and hawks (*Accipiter* spp.). Predators of adult and juvenile marbled murrelets include peregrine falcons (*Falco peregrinus*), bald eagles (*Haliaeetus leucocephalus*) and western gulls (*Larus occidentalis*).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

The adequacy of regulatory mechanisms has improved with federal and state listings as a Threatened species and implementation of the Northwest Forest Plan and Habitat Conservation Plans on private lands. Birds are still taken as by-catch in drift net and gill net fisheries, indicating that existing regulatory mechanisms may be inadequate to protect marbled murrelets.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Continued survival and recovery of this species is complicated by low productivity due to high nest failure rates and continuing mortality due to oil spills and gill-net entanglement mortality. These factors may be exacerbated by marine climate change, which has reduced marine productivity in waters adjacent to nesting areas.

In Puget Sound, the Columbia River and Grays Harbor area, marbled murrelets are particularly vulnerable to acute and chronic exposure to oil and other marine pollutants. These factors lead to death or reduced reproduction in marbled murrelets because of their extensive use of nearshore waters and their proximity to onshore oil facilities, tanker ports, industrial developments and shipping routes. Marine circulation changes (El Niño Southern Oscillation) may result in the reduced abundance and quality of prey species, and precipitate changes in food availability, predation pressure, or distribution of productive marine habitats (upwelling, tidal fronts).

3-6.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Marbled murrelets rely upon estuarine and marine habitats which may be altered by a number of activities authorized by Washington DNR. Transportation projects such as roadways, bridges, and docks may result in habitat loss during construction, while stormwater runoff from the structures may increase concentrations of heavy metals, salts and petroleum products that are known to degrade habitat. Sewage or other wastewater outfalls may cause localized reductions in water quality resulting in increased turbidity, eutrophication, decreased habitat quality, and the potential disturbance of nesting. Construction and operation of harbors, ports, shipyards, marinas, petroleum and ferry terminals could cause habitat reduction and degradation, increased disturbance and increased risk of exposure to spilled oil and fuel, which would affect marbled murrelet survival and productivity. Offshore overwater structures such as log booms, rafts, floats and breakwaters may reduce habitat availability. Boathouses, slips/berths, wharves and docks also reduce habitat availability and add disturbance from vessel traffic. Nearshore activities that cause sediment disturbance, increase contamination or cause additional disturbance such as sand and gravel mining, dredge spoil removal and disposal and aquaculture may cause habitat degradation, reduction in forage availability and displacement due to disturbance.

3-6.8 Species Coverage Recommendation and Justification

It is recommended that marbled murrelets be addressed as **Covered Species** for the following reasons: 1) Marbled murrelets are listed as a Threatened species by both the state and federal governments. In addition, a recent review of the species concluded that the marbled murrelet population in Washington, Oregon and California is still likely to become an Endangered species within the foreseeable future; 2) Washington DNR authorized activities have a "high" potential to affect marbled murrelets; and 3) Sufficient information is available to assess impacts of projects and develop conservation measures.

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3-7 Tufted Puffin

3-7.1 Species Name

Fratercula cirrhata

Common Name: Tufted puffin

Initial coverage recommendation: Evaluation

3-7.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (NOAA FISHERIES)

Species of Concern

WASHINGTON FISH AND WILDLIFE STATUS

Candidate

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S3/4B, S4N

3-7.3 Range

Tufted puffins are distributed throughout the North Pacific Ocean with 80 percent of the world population (2.9 million birds) nesting along coastlines and offshore islands from California to Cape Lisburne, Alaska (Piatt and Kitaysky 2002). Tufted puffins are the most sea-going of the auk, murre and puffin family, spending their non-breeding and wintering stages mid-ocean throughout the North Pacific, south to 35°N latitude (Piatt and Kitaysky 2002).

Tufted puffins arrive at Washington nesting colonies in the Pacific Northwest Coast and Puget Trough ecoregions during early April and they remain through mid-September. An estimated 22,300 birds nest at 16 locations, primarily along the outer coastline (Piatt and Kitaysky 2002, Speich and Wahl 1989) with the largest nesting colonies are on Carroll, Jagged and Alexander Islands (Smith et al. 1997), where tufted puffins dig burrows in grassy slopes or at cliff edges (Speich and Wahl 1989) (Appendix F). Less than 1 percent of the North American population nests in Washington.

3-7.4 Habitat Use

NESTING

Tufted puffins arrive at Washington nesting colonies during early April (Piatt and Kitaysky 2002; Speich and Wahl 1989). Tufted puffins are sexually mature between 3 and 4 years old. During breeding, adults forage in shelf slope and shelf-edge habitats generally within 100 kilometers of colonies (Piatt and Kitaysky 2002). Tufted puffins forage more frequently offshore in continental shelf slope habitats over unconsolidated or consolidated bottoms than in nearshore habitats (Piatt and Kitaysky 2002). About 50 to 70 percent of adult diet is invertebrates, primarily squid, polychaete worms, and euphausiids (krill), with the remaining 30 to 50 percent fish. Females lay one egg between April and June and both parents assist with incubation that usually lasts approximately 7 weeks. Adults feed chicks a wide variety of small schooling fish, such as anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasi*), capelin (*Mallotus villosus*), lanternfish (Myctophidae), juvenile Pollock (*Theragram chalcogram*ma), rockfish (*Sebastes* spp.), greenling (Hexagrammidae) and Pacific sandlance (*Ammodytes hexapterus*). Estimated foraging dive depths are up to 110 meters, but most tufted puffins probably forage at depths of less than 60 meters (Piatt and Kitaysky 2002).

WINTERING

Most tufted puffins leave coastal shelf waters by October and winter mid-ocean throughout the North Pacific, (Piatt and Kitaysky 2002) feeding on squid, lanternfish (Myctophidae), northern smoothtongue (*Leuroglossus stilbius*), Pacific saury (*Coloabis saira*), and euphausiids (Piatt and Kitaysky 2002).

3-7.5 Population Trends

Tufted puffins nesting populations are currently increasing in the northern portions of their range from the Gulf of Alaska westward, but decreasing in the southern portions of their range from southeast Alaska to California (Piatt and Kitasky 2002).

In Washington, whole colony counts, plot counts within colonies, and pelagic survey counts all indicate a 14 to 17 percent annual decline in abundance from the 1980s to 2001, with recent trends of 21 percent decline per year (Piatt and Kitasky 2002; Wahl and Tweit 2000). Tufted puffins within the waters of the Strait of Juan de Fuca have been reduced from 400 birds at Protection Island during 1970 to 18 birds in 2001 (Speich and Wahl 1989; Piatt and Kitaysky 2002). It has been suggested that the total nesting population for Washington may be an order of magnitude lower than during the 1970s and 1980s (Piatt and Kitasky 2002).

3-7.6 Assessment of Threats Warranting ESA Protection

The threats to tufted puffins presented below are summarized from Piatt and Kitayski (2002), Speich and Wahl (1989) and Gjerdrum et al. (2003).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Marine circulation changes (El Niño Southern Oscillation) resulting in reduced abundance and quality of prey species. Tufted puffins are vulnerable to oil spills because of their habitat use within shipping channels. Human disturbance (foot, boat, kayak) at nesting colonies can result in lost or reduced productivity.

OVER UTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES INCLUDE

Tufted puffin populations have failed to recover from previous declines related to human harvest, especially at small breeding colonies. There are no known scientific or educational uses for tufted puffins.

DISEASE OR PREDATION

Adults are preyed upon by bald eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrinus*). Chicks and eggs are taken by common ravens (*Corvus corax*) and large gulls (*Larus* spp.). Nests may also be preyed upon by introduced species such as the Norway rat (*Rattus norvegicus*) and the European rabbit (*Oryctolagus cuniculus*).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

Although colonies are protected by location within marine sanctuaries, they may still be subject to human disturbance. Oil spills have contributed to mortality during the past 20 years, and birds are still taken as by-catch in drift net and gill net fisheries, indicating that existing regulatory mechanisms may be inadequate to protect tufted puffins.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Other factors potentially affecting tufted penguins include: reduced marine productivity in coastal and offshore waters from global marine climate change and interannual and decadal climate variability; mortality due to oil spills; gill-net entanglement and drowning; and human disturbance and predation.

3-7.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Tufted puffins are likely to be affected by activities authorized by Washington DNR on state-owned aquatic lands. Overwater structures such as log booms/rafts, floats, docks/wharves and breakwaters may reduce nesting and foraging areas. Roadways, bridges, and docks could reduce habitat and disturb wintering, brood-rearing and potentially nesting populations. Outfalls and discharges associated with aquaculture and industry may cause localized reduction of water quality which adversely affects forage fish that comprise a large part of the tufted puffin's diet. In addition, aquaculture may cause habitat degradation and a reduction in forage availability resulting in displacement. Nearshore activities such as sand and gravel mining, dredging and dredge disposal may cause increased sedimentation and/or the direct loss of important prey species. Construction and operation of harbors, ports, shipyards, marinas, petroleum and ferry terminals could cause habitat reduction and degradation and increased disturbance. They could also cause an increased risk of exposure to spilled oil and fuel, which would affect tufted puffin productivity and survival.

3-7.8 Species Coverage Recommendation and Justification

It is recommended that tufted puffins be addressed as a **Covered Species** for the following reasons: 1) Tufted puffins are federally listed as a Species of Concern and a Candidate Species in the state of Washington; 2) Washington DNR authorized activities have a "high" potential to affect tufted puffins; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

3-7.9 References

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3-8 Western Snowy Plover

3-8.1 Species Name

Charadrius alexandrinus nivosus

Common Name: Western snowy plover

Initial coverage recommendation: Evaluation

3-8.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE)

Threatened (1993)

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Endangered

NATURAL HERITAGE PROGRAM GLOBAL RANK

G4

NATURAL HERITAGE PROGRAM STATE RANK

S1

3-8.3 Range

While the snowy plover (*Charadrius alexandrinus*) occurs throughout the Americas, Europe, Africa and Asia (Page et al. 1995b), the western subspecies (*C. a. nivosus*) breeds only along the Pacific Coast of the United States and Mexican, and into the inland West. The Pacific Coast distinct population segment of the western snowy plover breeds from Damon Point, Washington, to Bahia Magdalena, Baja California, Mexico, with most occurring from San Francisco Bay southward (Page et al. 1991; Palacios et al. 1994; 66 Code of Federal Regulations Part 157, 2001).

Only members of the Pacific Coast population of western snowy plovers occur in Washington (Page et al. 1995b), and they occur during all parts of the year (Richardson 1995). Historically, breeding snowy plovers were found on at least five areas in western

Washington; however, there are now only three known active breeding grounds: Damon Point/Oyhut Wildlife Area in Grays Harbor County, along with Midway Beach and Ledbetter Point/Gunpowder Sands in Pacific County (Richardson 1995; 64 Code of Federal Regulations Part 234, 1999). All three breeding sites have been proposed as critical habitat units in addition to Copalis Spit in Grays Harbor County, an unoccupied area that has been identified for possible inclusion for the critical habitat designation (69 Code of Federal Regulations Part 242, 2004). No nesting has been documented within eastern Washington, although several individuals have been observed there since 1967 (Richardson 1995). A figure representing the distribution of western snowy plovers in Washington may be found in Appendix F.

3-8.4 Habitat Use

Pacific Coast western snowy plovers prefer flat, sandy areas with little or no vegetative cover, such as that found on barrier beaches, playas (dry lake beds), salt flats and to a lesser extent, other beach types (Wilson-Jacobs and Meslow 1984; Palacios et al. 1994). The species has an average life span of approximately 3 years, reaching sexual maturity at 1 year of age (Page et al. 1995b).

NESTING

Western snowy plovers nest primarily above the high tide line on coastal beaches, sand spits, dune-backed beaches, sparsely-vegetated dunes; along beaches at creek and river mouths; and salt pans at lagoons and estuaries. They will nest secondarily at bluff-backed beaches, dredge spoil piles, salt-pond levees, dry salt ponds and river bars (Palacios et al. 1994; Powell 2001). Nesting on beaches in Oregon usually begins in April and May, but may continue into July (Wilson-Jacobs and Meslow 1984). Nesting time was similar in California with eggs usually hatching after an incubation period of slightly less than one month (Warriner et al. 1986). Fledging occurs after a nestling period that lasts about 31 days, during which time the male attends to the chick (Warriner et al. 1986). Most snowy plover will breed following their first year of life, and will typically lay two to three clutches of three eggs annually (Page et al. 1995b).

WINTER

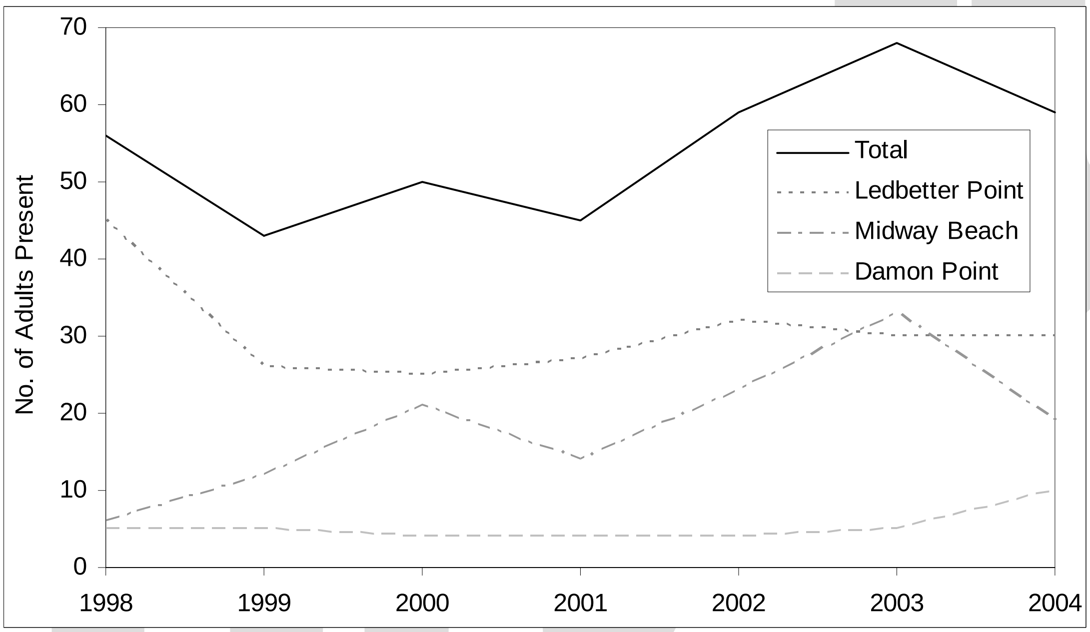
Both coastal and interior breeding snowy plovers winter along the Pacific Coast and in the Gulf of California (Page et al. 1995a; Powell et al. 2002), and preferred habitats include beaches, man-made salt ponds, estuarine sand and mud flats (Page et al. 1995b).

3-8.5 Population Trends

The estimated United States breeding population of coastal western snowy plovers in 1988 to 1989 for the Pacific Coast states was about 1,900 birds, down from an estimated 2,300 birds during 1977 through 1980 (Page et al. 1991). Winter populations in San Diego County from 1995 through 1999 were similar to counts in 1984 and 1986, although the employed survey methods limit direct comparison (Powell et al. 2002).

Up to eight pairs nested at Damon Point between 1979 and 1989 (Page et al. 1991) and in 1993, three of four nests successfully hatched chicks, with six of the ten chicks fledged (Richardson 1995). In 1994, six adults and four nests were recorded (Richardson 1995). At Ledbetter Point, annual nesting ranged from 4 to 12 pairs from 1979 to 1989 and in 1993 and 1994 (Page et al. 1991; Richardson 1995). Beginning in 1998, intensive nesting surveys were conducted at Damon Point, Ledbetter Point, and a recent colony discovered on Midway Beach. Increasing nesting activity and high reproductive success during 2004 may indicate a small population not in decline in Washington.

Figure 3-8.1 Snowy plover nesting effort documented during intensive survey of three known breeding areas in Washington State (Jensen, Personal communication. March 4, 2005).



3-8.6 Assessment of Threats Warranting ESA Protection

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Commercial and residential development and construction of jetties, parks and marinas have resulted in the loss of snowy plover habitat (Palacios et al. 1994; Richardson 1995). Snowy plovers are also sensitive to disturbance, and human activity increases related to development of beach areas has reduced breeding success and winter habitat use (Warriner et al. 1986; Ruhlen et al. 2003, Lafferty 2001). The introduction of non-native beach grasses has been shown to exclude nesting in previously utilized areas, reduce prey abundance, and increase mammalian nest predator abundance (Neuman et al. 2004, Slobodchikoff and Doyen 1977).

OVER-UTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

Although historically snowy plovers and their eggs have been collected for museum and private collections, protection is currently afforded under the Endangered Species Act and the Migratory Bird Treaty Act.

DISEASE OR PREDATION

Intentional stabilization of dunes using European beach grass has resulted in succession of other plant species that in turn increased the abundance of mammalian nest predators (Richardson 1995). Predation has contributed to nest failure (Warriner et al. 1986; Powell et al. 2002).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

Newly accreted tidelands are often utilized by nesting snowy plovers, yet jurisdiction and/or ownership may not be easily determined without a court decision due to a “moving-boundary” theory of land ownership (Richardson 1995). The potential also exists for disturbance of nesting snowy plovers in Washington due to difficulties in managing beach recreationalists across boundaries of several management agencies (Jensen, Personal communication. March 4, 2005).

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Although there are no other recognized natural or manmade factors affecting these plovers in Washington, the definition of populations within this species is currently being debated, and the outcome could influence the recognition of distinct populations and the listing status.

3-8.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Western snowy plovers are likely to be affected by activities authorized by Washington DNR on state-owned aquatic lands. Overwater structures, such as docks/wharves and breakwaters, may reduce foraging areas. Roadways, bridges and docks could reduce foraging habitat and disturb roosting or nesting populations. Construction and operation of harbors, ports, shipyards, marinas and petroleum and ferry terminals could cause habitat reduction and degradation and increased disturbance. These activities could also cause an increased risk of exposure to spilled oil and fuel, which would affect western snowy plover survival.

3-8.8 Species Coverage Recommendation and Justification

It is recommended that the western snowy plover be recognized as a **Covered Species** for the following reasons: 1) The coastal population of western snowy plovers is currently listed as Threatened under the Endangered Species Act; 2) Washington DNR authorized activities have a “high” potential to affect western snowy plovers; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

3-8.9 References

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3-9 American White Pelican

3-9.1 Species Name

Pelecanus erythrorhynchos

Common Name: American white pelican

Initial coverage recommendation: Covered

3-9.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not Listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Endangered

NATURAL HERITAGE PROGRAM GLOBAL RANK

G3

NATURAL HERITAGE PROGRAM STATE RANK

S1B, SZN

3-9.3 Range

The American white pelican is found locally west of the Mississippi River and along the Gulf Coast (Peterson 1990; Sibley 2000; King and Michot 2002; Knopf 2004). In Canada, it breeds in southern British Columbia, northern Alberta, northeast Saskatchewan, southwest Manitoba and southwest Ontario. Although seemingly widespread, this species forms two geographic populations that are east and west of the Rocky Mountains, with little intermixing. The eastern population breeds locally from Minnesota west through the Dakotas and into Montana, Wyoming and Colorado, and north to northern Alberta, northeast Saskatchewan, southwest Manitoba and southwest Ontario. Many American white pelicans from the eastern population winter along the southern U.S. coast from Florida to northern Mexico (King and Michot 2002). The western population breeds in parts of Utah, Nevada, California, Oregon, Washington, and north into British Columbia, and winters from the Pacific Northwest south to Baja California, Mexico and into Nicaragua (Knopf 2004). Young pelicans do not mature until the third or fourth year after hatching, and non-breeding pelicans may summer anywhere within their normal winter or migrant range (Knopf 2004).

Historically, American white pelicans have been observed infrequently throughout eastern Washington, with a few existing breeding colonies present (Wahl in press). Current observations are most frequent in the Columbia Basin, with non-breeding pelicans often observed in the Columbia River and its tributaries, the Potholes Reservoir, and many of the smaller lakes in the vicinity (Thompson, Personal communication. February 24, 2005). Non-breeding American white pelicans have also been recorded on the Pend Oreille River, Palmer Lake (Okanogan County), Sprague Lake (Lincoln/Adams County) and on Brown's Island (Columbia River, Klickitat County).

In western Washington, observations are infrequent and unlikely as this species resides almost exclusively east of the Cascade Mountains in the Pacific Northwest (Washington Fish and Wildlife 2005; Thompson, Personal communication. February 24, 2005; Wahl et al. in press). The only known breeding colony is located on Crescent and/or Badger Islands in the Columbia River, approximately 20 kilometers upstream of McNary Dam and part of the McNary National Wildlife Refuge. Successful breeding began in 1994 and has continued annually, except during 2001 (Ackerman 1994; Wahl et al. in press; Washington Fish and Wildlife 2005).

3-9.4 Habitat Use

American white pelicans have a maximum documented life span of 26 years and reach sexual maturity at 3 years of age (Knopf 2005). Breeding colonies are typically located on isolated islands within freshwater lakes or rivers (Knopf 2004). These birds may fly long distances (greater than 100 kilometers) to forage on fish in lakes and rivers (Knopf 2004), with locations influenced by prey abundance (Derby and Lovvorn 1997; Kaeding 2002).

NESTING

Adults, accompanied by nonbreeding subadults arrive during April to begin nesting and the young are usually fledged by late August (Livingston, Personal communication. February 24, 2005). Nesting generally takes place on islands free of disturbance with little or no woody vegetation. Islands and exposed bars adjacent to foraging areas are used for roosting and loafing (McMahon and Evans 1992). While individuals may return to their natal colony, they do not breed until their third year (Knopf 2004). Adults usually lay two eggs and fledge slightly less than one per nest within 17 to 25 days after hatching (Knopf 2004).

WINTERING

This species winters on rivers and/or lakes free of ice and containing ample fish populations from the Pacific Northwest south to Baja California, Mexico and into Nicaragua (Knopf 2004). American white pelicans also use exposed bars and islands for roosting and loafing.

3-9.5 Population Trends

The North American Breeding Bird Survey index indicates increasing trends for this species in the western Breeding Bird Survey (BBS) region and the Columbia Plateau, and increasing but highly variable in the Pacific Northwest since 1966 (Sauer et al. 2004). The McNary National Wildlife Refuge colony was monitored from 1994 to present, and reproduction has been stable. During the years from 2002 to 2004, reproduction at the McNary colony has averaged about 226 young per year with a success rate of 1.12 young per mating pair, a high of 301 chicks fledged and 1.48 young per pair during 2004 (Livingston, Personal communication. February 24, 2005).

3-9.6 Assessment of Threats Warranting ESA Protection

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Human presence and disturbance from a powerboats and low-flying aircraft are known to have caused egg loss or abandonment (Blood 1993).

Also, the bioaccumulation of contaminants in the environment threatens many piscivorous bird populations, including white pelicans. Concentrations of organochlorides, selenium, cadmium and mercury have been detected in pelican livers and attributed to a fish diet (Donaldson and Braune 1999). In Blus et al. (1998), a limited number of deformities were observed in the Crescent Island Forster's tern (*Sterna forsteri*) that nest concurrently with the pelicans on Crescent Island, and although polychlorinated biphenyls (PCBs), dioxin and furan levels in tern eggs were low deformity rates were similar to those found in highly contaminated areas (Blus et al. 1998). PCBs were not detected in four addled pelican eggs in the Crescent Island colony, but the insecticide, dichlorodiphenyl-trichloroethane (DDT) and its derivatives, as well as other organic contaminants, were detected at low levels (Blus et al. 1998).

OVER-UTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

American white pelicans are not utilized commercially or recreationally. If scientific or educational use does occur, it is highly regulated.

DISEASE OR PREDATION

Disease or predation are not known to be threats to American white pelican populations.

ADEQUACY OF EXISTING REGULATORY MECHANISMS

The single breeding colony of American white pelicans in Washington is located within the boundaries of the McNary National Wildlife Refuge. Current regulations governing public access during the pelican nesting season have proven to be adequate, based on successful reproduction within the colony.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

There are no other known factors affecting the American white pelican's existence.

3-9.7 Assessment of Potential Effects from Washington DNR Authorized Activities

American white pelicans are likely to be affected by some activities authorized by Washington DNR on state-owned aquatic lands, particularly those that contribute to disturbance of the colony during the breeding season. Roadways, bridges and docks could reduce foraging habitat and disturb roosting populations. Stormwater runoff may increase concentrations of pesticides, fertilizers, heavy metals, salts and petroleum products in the water column, which directly impacts prey species of the American white pelican. Construction and operation of harbors, ports, shipyards, marinas and petroleum and ferry terminals near nesting areas could increased disturbance to them. These activities could also cause an increased risk of exposure to spilled oil and fuel, which would affect white pelican survival.

3-9.8 Species Coverage Recommendation and Justification

It is recommended that the American white pelican be addressed as an **Evaluation Species** for the following reasons: 1) Although the American white pelican is not federally listed, it is listed as Endangered by the state of Washington; 2) The potential for effects from Washington DNR management activities is “low”; and 3) Insufficient information is available to develop conservation measures.

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3-10 Brown Pelican

3-10.1 Species Name

Pelecanus occidentalis

Common Name: Brown pelican

Initial coverage recommendation: Evaluation

3-10.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE)

Endangered (1970) – Except on the Atlantic coast, Florida and Alabama, where it was de-listed as recovered in 1985

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Endangered

NATURAL HERITAGE PROGRAM GLOBAL RANK

G4

NATURAL HERITAGE PROGRAM STATE RANK

S3N

3-10.3 Range

There are six recognized subspecies of brown pelican (US Fish and Wildlife 2005a) that collectively range from North America south to Mexico, the West Indies and Caribbean, into to Guyana and Venezuela (Shields 1987) in South America (US Fish and Wildlife 2005b). Three subspecies occur in the United States, with the Caribbean brown pelican (*P. o. occidentalis*) found only in Puerto Rico and the United States Virgin Islands. The eastern brown pelican (*P. o. carolinensis*) occurs from along the Atlantic coast to Florida, Alabama, Louisiana, Mississippi, Texas and in the Barrier Islands (US Fish and Wildlife 2005c), with the California brown pelican occurring in California, Oregon and Washington (US Fish and Wildlife 2005a).

In Washington, the California brown pelican is currently fairly common to locally abundant as a nonbreeding summer and fall visitor on the ocean coast, but is rare in winter and spring (Wahl et al. In Press). The species is very rare in freshwater systems and in the estuaries north and south of the Tacoma Narrows (Wahl et al. In Press). Grays Harbor and Willapa Bay are important roosting areas, with East Sand Island in the Columbia River a more recent roosting site. Most reports are from the Strait of Juan de Fuca south to Point No Point, and less frequently in the San Juan Islands, the southern portion of Georgia Strait, Port Susan and the Central Basin off Seattle. A figure representing the distribution of brown pelicans in Washington may be found in Appendix F.

3-10.4 Habitat Use

California brown pelicans breed and nest in colonies on islands in the Gulf of California and along the outer coast from Baja California to West Anacapa and the Santa Barbara Islands in Southern California. Adults typically mature at 3 to 5 years of age and lay three eggs annually during their 4 to 7 year reproductive span (Shields 2002). Fledging rates are around one per nest but vary with food availability (Shields 2002).

FORAGING

Nonbreeding California brown pelicans range northward along the Pacific Coast from the Gulf of California to Washington and southern British Columbia (US Fish and Wildlife 2005b). The species forages mainly on surface-schooling fish (Washington Fish and Wildlife 2005) in shallow estuarine and inshore waters, mostly within 10 kilometers (6 miles) of the coast and less often up to 64 kilometers (40 miles) from shore (US Fish and Wildlife 2005d). More than 97 percent of the 32,533 birds surveyed at Grays Harbor from 1971 to 2000 were in the channel or in littoral waters offshore (Wahl et al. In Press).

ROOSTING

Roosting and loafing sites provide important resting habitat for breeding and nonbreeding California brown pelicans. Important roosting sites include offshore rocks and islands, river mouths with sandbars, breakwaters, pilings and jetties along the Pacific Coast and San Francisco Bay (US Fish and Wildlife 2005b).

3-10.5 Population Trends

The North American Breeding Bird Survey (BBS) index indicates increasing numbers over the whole United States; increasing but highly variable numbers in the Western BBS region and in the Pacific Northwest; and highly variable yet slightly increasing numbers in Oregon and California (Sauer et al. 2004).

Changes in abundance of several marine species off the west coast in the early 1990s were associated with changes in ocean productivity. Record numbers of brown pelicans appeared in the fall of 1997, with more than 300 birds occurring along the Strait of Juan de Fuca and 90 birds estimated in Hood Canal and from Puget Sound south to Olympia.

There was one record of California brown pelican occurrence in eastern Washington in October 1997 (Wahl et al. In Press).

Grays Harbor surveys from 1971 to 2000 only recorded single birds in 1977 and 1982, but during the El Niño event of 1983, hundreds came north from California. Numbers were similar for several years, dramatically increased in 1989, and remained at variably high levels through 1998. It was estimated that up to 7,000 birds have occurred along the Washington-Oregon coast in late summer since 1985, and shore counts in the early 1990s peaked at 1,000 birds each in Grays Harbor and Willapa Bay. The most important roost north of California from 1987 to 1997 was in Willapa Bay, where an average 2,178 birds were present during aerial surveys. Birds commuted between there and Grays Harbor, where Whitcomb Island was another important roost prior to channel-dredging and its subsequent disappearance in the 1990s. In 1999, up to 6,000 birds roosted on a sand island in Willapa Bay. Erosion and disturbance there resulted in relocation to surrounding estuaries, with more than 9,000 present at East Sand Island in the Columbia River in 2002 (Wahl et al. In Press).

3-10.6 Assessment of Threats Warranting ESA Protection

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

The present destruction, modification or curtailment of habitat or range by humans was not identified by the US Fish and Wildlife as being an issue for the California subspecies of the brown pelican (US Fish and Wildlife 1983; 2005a). As with other seabird populations, brown pelicans may be susceptible to human-induced catastrophic events such as oil spills (Anderson et al. 1996). Reproductive success may also be affected by natural catastrophes (e.g., landslides or fires). While this may be a limiting factor in isolated, local situations it is probably of little consequence to long-term population trends (US Fish and Wildlife 1983).

OVER-UTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

Brown pelicans are not used for commercial or recreational activities. If scientific or educational use does occur, it is highly regulated.

DISEASE OR PREDATION

Disease outbreaks (King et al. 1977; Dyer et al. 2002; Norcross and Bolen 2002) in California brown pelicans may result from overcrowding in harbors (US Fish and Wildlife 1983; 2005a). Disease and predation may be limiting factors in isolated, local situations but probably are of little consequence to long-term population trends (US Fish and Wildlife 1983).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

The inadequacy of existing regulatory mechanisms was not identified by the US Fish and Wildlife as being an issue for the California brown pelican (US Fish and Wildlife 1983; 2005a).

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

There are three types of manmade and natural factors that could affect the continued existence of the California brown pelican: pollution (US Fish and Wildlife 1983; 2005a), human disturbance (US Fish and Wildlife 1983) and weather (US Fish and Wildlife 1983; 2005).

The brown pelican was listed as Endangered in 1970 because of widespread pollutant-related reproductive failures (50 Code of Federal Regulations Part 17, 1970). They are extremely sensitive to bioaccumulation of the pesticide dichlorodiphenyltrichloroethane (DDT), which causes reproductive failure by altering calcium metabolism and thinning eggshells (Jehl 1973). In 1985, brown pelican populations on the Atlantic Coast had recovered enough that they could be removed from the Endangered species list (50 Code of Federal Regulations Part 17, 1985). Although California breeding populations have rebounded since the elimination of DDT use (Anderson and Gress 1983), persistent residues in the coastal environment continue to cause chronic reproductive problems (US Fish and Wildlife 1983, 2005a; Carter et al. 2005) and some California brown pelicans still show relatively high levels of pesticides in their tissues (US Fish and Wildlife 2005a). The California brown pelican is also Threatened by the possibility of oil spills from tanker traffic in the Santa Barbara Channel (Anderson et al. 1996; Carter et al. 2005; US Fish and Wildlife 1983 and 2005).

Breeding populations of the California brown pelican are Threatened by human disturbance in the form of recreation (including fishermen, birders, photographers, educational groups) and military and civilian aircraft noise (US Fish and Wildlife 1983). Human disturbance has been identified as a problem at post-breeding roosts on the central California coast, along with entanglement in hooks and fishing line (US Fish and Wildlife 2005a). Human disturbance may be a limiting factor in isolated, local situations but probably is of little consequence to long-term population trends (US Fish and Wildlife 1983).

California breeding populations and nest productivity may vary dramatically from year to year depending on El Niño events and other climatic changes (US Fish and Wildlife 2005a), and may also be affected by severe storms (US Fish and Wildlife 1983). Weather may be a limiting factor in isolated situations but probably is of little consequence to long-term population trends (US Fish and Wildlife 1983).

California brown pelicans are dependent on northern anchovies (US Fish and Wildlife 1983; 2005a; Washington Fish and Wildlife 2005) and Pacific sardines (US Fish and Wildlife 2005a), both of which have declined (US Fish and Wildlife 2005a). Since about 1974, food availability (Carter 2005) has become the most important limiting factor influencing pelican breeding success (US Fish and Wildlife 1983). However, it is not clear that food availability in nonbreeding resident populations, such as those that occur in the Pacific Northwest, is a limiting factor for the California subspecies (US Fish and Wildlife 1983; 2005a).

3-10.7 Assessment of Potential Effects from Washington DNR Authorized Activities

California brown pelicans are likely to be affected by activities authorized by Washington DNR on state-owned aquatic lands. Overwater structures, such as log booms/rafts and docks/wharves may reduce foraging areas. Stormwater runoff may increase concentrations of pesticides, fertilizers, heavy metals, salts and petroleum products in the water column, which directly impacts prey species of the California brown pelican. Outfalls and discharges associated with aquaculture and industry may cause localized reduction of water quality, which adversely affects forage fish that comprise a large part of the brown pelican's diet. Construction and operation of harbors, ports, shipyards, marinas, petroleum and ferry terminals could increase the risk of exposure to spilled oil and fuel, which could affect brown pelican survival.

3-10.8 Species Coverage Recommendation and Justification

It is recommended that the California brown pelican be addressed as an **Evaluation Species** for the following reasons: 1) It is Federally and State listed as Endangered; 2) Washington DNR authorized activities have a "medium" potential to affect California brown pelicans; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

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3-11 Cassin's auklet

3-11.1 Species Name

Ptychoramphus aleuticus

Common name: Cassin's auklet

Initial coverage recommendation: Evaluation

3-11.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE)

Species of Concern

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Candidate

NATURAL HERITAGE PROGRAM GLOBAL RANK

G4

NATURAL HERITAGE PROGRAM STATE RANK

S3

3-11.3 Range

Cassin's auklet breeds from subboreal to subtropical waters along the Pacific Coast, between the Aleutian Islands, Alaska, and Baja, California (Manuwal 1974; Manuwal and Thoresen 1993; Kaufman 1996). Within this range, the highest breeding densities occur along the coast of British Columbia, particularly Triangle Island, where an estimated 60 to 75 percent of the breeding population resides (Vermeer et al. 1979; Manuwal and Thoresen 1993). Species distribution during the nonbreeding season is poorly known. Although some populations in California appear to be sedentary, it is believed this species spends most of its time at sea (Manuwal and Thoresen 1993).

While breeding populations in Washington have been little studied (Manuwal and Thoresen 1993), Dawson (1908) estimated more than 2,500 breeding adults on four nearshore islands along the outer west coast of Washington. Recently eight known nesting locations have been documented: Mid-Bodelteh Island, East Bodelteh Island, Carroll Island, Jagged Island, Alexander Island, Tatoosh Island, and Dhuoyautzachtahl, all of which are along the Olympic Coast in Clallam and Jefferson counties (Paine et al. 1990; Speich and Wahl 1989).

3-11.4 Habitat Use

NESTING

Cassin's auklets may live to approximately 6 years of age and are slow to reproduce (Manuwal and Thoreson 1993). Adults may breed the during their second year, but most wait until the fourth year of life (Manuwal and Thoreson 1993). Clutch size is small, typically one egg, therefore limiting the number of fledglings to fewer than one per pair annually (Manuwal 1974).

Breeding is apparently restricted to offshore islands along the Pacific Coast, especially those where soft soils have accumulated (Thoresen 1964; Vermeer et al. 1979). Cassin's auklets typically nest in burrows, but may also use rock crevices, debris piles, or other similar cavities that provide protection from gulls and the elements (Thoresen 1964; Manuwal 1974; Vermeer et al. 1979). Preferred nesting habitat generally contains sparse shrub cover and short herbaceous vegetation (Thoresen 1964; Vermeer et al. 1979). On Triangle Island, British Columbia, auklets nested on all slopes and relatively flat areas, with the highest densities occurring on southern-facing slopes near the open summit and edge of the plateau (Vermeer et al. 1979). Studies conducted in California indicated that Cassin's auklets typically mate in mid to late spring with eggs hatching after about 38 days of incubation and fledging occurring about 41 days after hatching (Manuwal 1974).

FORAGING

Cassin's auklets feed from the ocean surface, concentrating in areas where prey (primarily euphausiids, amphipods, copepods and small fish) is abundant (Speich and Wahl 1989; Manuwal and Thoresen 1993). Average foraging depth of auklets breeding in the Queen Charlotte Islands, British Columbia, was 28 meters (Burger and Powell 1990). In California, auklets generally foraged within 30 kilometers of breeding colonies, although foraging distance was largely attributed to prey availability (Adams et al. 2004). Prey availability, and consequently foraging habitat, is highly variable due to fluctuations in coastal upwellings in the California Current system (Briggs et al. 1987; Bertram et al. 2001; Sydeman et al. 2001; Hedd et al. 2002). In years when ocean-warming events take place, the location of these upwellings may become less predictable, thereby decreasing foraging efficiency (Briggs et al. 1987). Consequently, auklets may abandon nests or breeding altogether when prey availability near breeding colonies becomes limited.

MIGRATION

Little is known about seasonal movement patterns of Cassin's auklets breeding along the Washington coast. Southern populations in California are apparently sedentary, whereas northern populations in Alaska and British Columbia are believed to be migratory

(Manuwal and Thoresen 1993). Briggs et al. (1987) estimated peak densities of 500,000 to 1,000,000 individuals off the California coast in late fall, indicating some of these birds may have been migrants.

3-11.5 Population Trends

Published information regarding population status and change appears to be limited and highly variable (Manuwal and Thoresen 1993). In Washington, the estimated breeding population was approximately 87,600 pairs between 1978 and 1982 (Speich and Wahl 1989). Other studies have focused primarily on breeding colonies at Triangle Island, British Columbia, and Farallones, California. On Triangle Island, the estimated breeding population was 359,000 pairs in 1977 (Vermeer et al. 1979) and 548,000 pairs in 1989 (Bertram et al. 2000). Bertram et al. (2000) suggest a declining population at Triangle Island between 1994 and 1997 is plausible based on low adult survival, increased reproductive failure and coincident declines in the number of Cassin's auklets breeding in the Farallones. Conversely, populations off British Columbia, Canada appear to have had good productivity and adult survival during this time (Gaston 1992; Bertram et al. 2000).

3-11.6 Assessment of Threats Warranting ESA Protection

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Human disturbance during nesting, particularly destruction of burrows caused by foot traffic, has reduced productivity (Thoresen 1964; Speich and Wahl 1989).

OVER-UTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There is no known use of Cassin's auklets for commercial, recreational, scientific, or educational purposes.

DISEASE OR PREDATION

Predation by introduced mammals (mice, foxes) on islands has been documented (Blight et al. 1999; Jones 1992).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

The Cassin's auklet is afforded protection under the Migratory Bird Treaty Act. It is not known whether regulatory mechanisms controlling public access to breeding sites within the Washington Islands Wilderness Area are adequate to minimize the effects of disturbance on Cassin's auklet breeding pairs.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Reduced prey abundance due to ocean warming linked to El Niño events within the California Current System has influenced reproductive success (Bertram et al. 2001; Sydeman et al. 2001; Hedd et al. 2002). Mortality has resulted from direct exposure to floating contaminants (e.g., oil) that accumulate in confluent areas where prey are abundant (Speich and Wahl 1989). Also introduced mammalian fauna may compete for burrows on coastal islands.

3-11.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Cassin's auklets are likely to be affected by few activities authorized by Washington DNR on state-owned aquatic lands. Stormwater runoff may increase concentrations of pesticides, fertilizers, heavy metals, salts and petroleum products in the water column, which directly impacts prey species of the Cassin's auklet. Construction and operation of harbors and marinas could cause an increased risk of exposure to spilled oil and fuel, which could affect Cassin's auklet survival.

3-11.8 Species Coverage Recommendation and Justification

It is recommended that the Cassin's auklet be considered an **Evaluation Species** because: 1) This species is a State Candidate and Federal Species of Concern; 2) Washington DNR authorized activities have a "low" potential to affect Cassin's auklets; and 3) There is insufficient information concerning population trends and habitat use during all life stages in Washington to assess impacts and to develop conservation measures.

3-11.9 References

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3-12 Eared Grebe

3-12.1 Species Name

Podiceps nigricollis

Common Name: Eared grebe

Initial coverage recommendation: Covered

3-12.2 Status and Rank

Status and Rank: See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not Listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Not Listed

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S2B, S4N

3-12.3 Range

Breeding populations of eared grebes are distributed throughout the western United States and into Canada, with the largest concentrations wintering at Mono Lake, California or the Great Salt Lake, Utah. Individuals also winter in Mexico and along the Pacific coastline as far north as southern British Columbia (Cullen et al. 1999).

In Washington, eared grebes breed on the east side of the Okanogan River (Appendix F) in the Columbia Plateau, Okanogan, and Canadian Rockies ecoregions. They winter in coastal areas of the Puget Trough and Pacific Northwest Coast (Appendix F).

3-12.4 Habitat Use

Eared grebes may life to 12 years of age, becoming sexually mature between 1 and 2 years of age (Cullen et al. 1999).

NESTING

Female eared grebes typically lay 3-4 eggs per clutch from May to June (Seattle Audubon 2002). The birds nest in colonies as large as hundreds of pairs, in small groups or as solitary pairs. They nest on shallow lakes and ponds with emergent vegetation and productive macroinvertebrate communities, and rarely on ponds with fish. Nesting density increases with increased phosphorous levels (conductivity, magnesium) and nesting density decreases with increased calcium and turbidity levels (Savard et al. 1994). These water quality parameters probably influence nesting through the relationship with invertebrate prey species abundance. While nesting on freshwater lakes and ponds, eared grebes feed primarily on aquatic invertebrates including water boatmen (Corixidae), predacious diving beetles (Dystiscidae), caddis fly larvae (Phrygonoidea), mayflies (Ephemiridae), midges (Chironomidae), damselflies (Zygoptera), dragonflies (Anisoptera) and other flies (Diptera) (Palmer 1962).

MIGRATION AND WINTERING

Eared grebes are often associated with hypersaline lakes and bays during migration and throughout the winter, where they feed on brine shrimp (*Artemia monica*) and brine flies (*Ephedra* sp.). Hundreds of eared grebes stage prior to migration on Soap Lake in Washington (Seattle Audubon 2002). In coastal environments, wintering eared grebes may also use shallow, nearshore waters along open sandy beaches; beaches with rocks and gravel; coastal lagoons with mud and marshes; and kelp beds feeding on small crustaceans and insects, as well as small fish, mollusks and amphibians (Cullen et al. 1999). Eared grebes commonly use shallow saline lakes and salt ponds throughout their range.

3-12.5 Population Trends

The eared grebe is the most abundant species of grebe in North America, with an estimated 4.1 million birds staging on hypersaline lakes in fall (Cullen et al. 1999). There is no demonstrable trend in population size or distribution in North America, although Breeding Bird surveys are inadequate for this species (Cullen et al. 1999).

3-12.6 Assessment of Threats Warranting ESA Protection

The threats to eared grebes presented below are summarized from Cullen et al. (1999).

DESTRUCTION, MODIFICATION, OR CURTAILMENT OF HABITAT OR RANGE

Threats include the loss or degradation of wetlands used for breeding and migration due to drainage for agriculture or urban/suburban development.

OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

There is no known commercial, recreational, scientific or educational use for eared grebes.

DISEASE OR PREDATION

Botulism and avian cholera can cause significant mortality to eared grebes; known predators of eggs, young and adults include: American coots (*Fulica americana*), mink (*Mustela vision*), herring gulls (*Larus argentatus*), great horned owl (*Bubo virginianus*), coyotes (*Canis latrans*), common raven (*Corvus corax*), other corvids and osprey (*Pandion haliaetus*).

ADEQUACY OF EXISTING REGULATORY MECHANISMS

Current regulations appear to be adequate for the protection of eared grebes during the breeding period, although the species does not consistently use the same wetlands for nesting (Seattle Audubon 2002). Wetland nesting habitats are provided some protection by Section 404 of the Clean Water Act, although these regulations will not prevent all wetland losses or disturbance to nesting, staging or wintering eared grebes.

OTHER FACTORS AFFECTING CONTINUED EXISTENCE

Other threats include nest losses due to wave action in windstorms, starvation in El Niño years, and reductions in food supplies due to the use of pesticides. In addition, human disturbance/destruction of nesting colonies or staging aggregations during recreational activities such as swimming, fishing, birding, boating, or canoeing may also pose significant threats to this species.

3-12.7 Assessment of Potential Effects from Washington DNR Authorized Activities

Eared grebes rely upon freshwater marshes which may be altered by a number of activities authorized by Washington DNR. Transportation projects such as roadways, bridges, and docks may result in habitat loss during construction, while stormwater runoff from the structures may increase concentrations of heavy metals, salts and petroleum products in wetlands that are known to degrade habitat. Invasive species control projects may disturb nesting behavior and alter utilized habitat. Navigation improvements involving dredging, filling or other alteration of wetlands may result in increased sedimentation and/or the direct loss of organisms and habitat. Sewage or other wastewater outfalls may cause localized reductions in water quality resulting in increased turbidity, eutrophication, decreased habitat quality, and the potential disturbance of nesting.

3-12.8 Species Coverage Recommendation and Justification

It is recommended that eared grebes be addressed as an **Evaluation Species** for the following reasons: 1) Although eared grebes lack federal and state protection status, breeding populations are designated as imperiled by the Washington Natural Heritage Program; 2) Washington DNR authorized activities have a “high” potential to affect eared grebes; and 3) Sufficient information exists to assess impacts and to develop conservation measures.

3-12.9 References:

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3-13 Brandt’s Cormorant

3-13.1 Species Name

Phalacrocorax penicillatus

Common Name: Brandt’s cormorant

Initial coverage recommendation: Evaluation

3-13.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Candidate

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S3B, S4N

3-13.3 Range

Brandt’s cormorant is one of six cormorant species found in North America and one of four found on the Pacific Coast (Sibley 2000). Although it breeds from Alaska to Mexico, it is mainly found from Washington to California (Harrison 1983; Wallace and Wallace 1998). This species is endemic to the California Current, an oceanic nutrient supply system present along the Pacific Coast (Boekelheide and Ainley 1989). The highest breeding concentrations are found between Oregon and California where upwelling of the California Current is most predictable.

Within Washington, it is unlikely that the species was a numerous or widespread breeder. It occurs year-round along the outer coast, but is less numerous than in Oregon and California (Speich and Wahl 1989; Wallace and Wallace 1998; Sydeman et al. 2001;

Couch and Lance 2004). This species is virtually exclusive to neritic and estuarine zones of the outer coast and is rarely observed inland (Kaufman 1996; Wallace and Wallace 1998; Sibley 2000). They have been observed nesting on the outer coast of the Olympic Peninsula between Copalis Rock and Cape Flattery (Dawson 1908; Speich and Wahl 1989, Wilson 1991) and Speich and Wahl (1989) reported 554 nests in four colonies (Cape Disappointment, Paahwoke-it, Willoughby Island and Split Rock) from 1979 to 1982 from various field survey efforts. In addition, Brandt's cormorants have recently been found nesting on a pile dike off of East Sand Island in the Columbia River estuary (Couch and Lance 2004). A figure representing the distribution of Brandt's cormorant in Washington may be found in Appendix F.

3-13.4 Habitat Use

Brandt's cormorants frequent marine subtidal and pelagic zones where coastal upwellings occur (Granholm 1983). They roost on prominent perch sites devoid of vegetation, usually rock outcroppings and pilings, or occasionally on sandy beaches (Granholm 1990; Wallace and Wallace 1998).

NESTING

Nesting occurs on in-shore or off-shore rocky islands and slopes of inaccessible shoreline cliffs (Wilson 1991; Speich and Wahl 1989; Kaufman 1996; Wallace and Wallace 1998). Although one colony has been established on a manmade pile dike within the Columbia River estuary (Couch and Lance 2004), it is uncharacteristic for this species to nest on manmade structures or within an estuary setting. Adults may mature during the second year of life, but typically do not breed until older (Wallace and Wallace 1988). Adults may live beyond ten years of age, but usually only breed three to eight seasons and fledge two to four young in their lifetime (Wallace and Wallace 1988). Annual breeding success varies with food availability and bird age (Wallace and Wallace 1988).

WINTERING

Although some Brandt's cormorants remain in areas frequented during the nesting season, many disperse both northward and southward to take advantage of abundant fish and invertebrate populations provided by ocean current upwellings. Many overwinter in the Strait of Juan de Fuca and Active Pass, British Columbia (Wallace and Wallace 1998). A very limited number of Brandt's cormorants have been observed inland up coastal rivers in Oregon (Granholm 1990).

3-13.5 Population Trends

Annual nesting can be highly variable because of close ties between the Brandt's cormorant nesting ecology and California Current perturbations. In years when ocean surface temperatures are warmed from El Niño events and prey decrease, numbers of nests may decline or nesting may be abandoned altogether (Wilson 1991). Also, the selection of inaccessible rocky islands and cliffs makes reproduction difficult to assess during ground-based survey efforts. These two factors make assessing population trends difficult without longer-term population monitoring efforts (Wilson 1991).

Currently, there are on-going nesting surveys performed within the Olympic Coast National Marine Sanctuary of the Washington coast, but population trend data are currently unpublished and unavailable at the time of this writing. However, in 1905, an estimated 310 nests among four breeding colonies were observed along the Olympic Peninsula outer coast (Dawson 1908). More recently (1979 to 1990), Brandt's cormorant nests numbers varied from 0 to almost 600 annually in the same general area (Speich and Wahl 1989; Wilson 1991). Undoubtedly, the use of aerial survey techniques limits comparisons between these surveys, but it does provide a general reference to historical versus present population size. Although breeding colonies have been lost from San Juan Island, the Strait of Juan de Fuca, Grenville Arch and Sea Lion Rock, colonies now exist on islets previously uninhabited (Dawson 1908; Wallace and Wallace 1998).

3-13.6 Species Coverage Recommendation and Justification

It is recommended that the Brandt's cormorant be considered a **Watch-list Species** for the following reasons: 1) Although this species is a Candidate Species in Washington, it is not listed federally; and 2) Its exclusivity to the outer coast limits the potential for impacts from Washington DNR authorized activities.

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3-14 Clark's Grebe

3-14.1 Species Name

Aechmophorus clarkii

Common name: Clark's grebe

Initial coverage recommendation: Evaluation

Until the early 1980s, Clark's grebe (*A. clarkii*) and the Western grebe (*A. occidentalis*) were thought to be two color morphs of the same species (Western grebe) because of the subtle differences in plumage and sympatric use of habitat (Storer and Nuechterlein 1992). Indication of the two color morphs being separate species came from evidence of assortative mating, reproductive isolating mechanisms and morphological differences (Ratti 1979; Nuechterlein 1981; Storer and Nuechterlein 1985). Thus, much of the published information about the natural history of these species refers to the light (now considered *A. clarkii*) and dark phases of the Western grebe. In the following review of, species-specific interpretations are made where applicable, but may also include biologically relevant information cited as or specific to *A. occidentalis*.

3-14.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not listed.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

State Monitor Species

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S2B, SZN

3-14.3 Range

The primary range of the Clark's grebe includes most of western United States and Canada, extending as far east as the Dakotas, southern Minnesota, western Nebraska and Kansas (Sauer et al. 2004). Single birds or widely scattered small groups were recorded in southern Manitoba, Saskatchewan, Alberta and southern British Columbia (Storer and Nuechterlein 1992; Sauer et al. 2004). The highest occurrences of breeding colonies are found in southern Oregon, northern California, southwestern Idaho, northern Utah and southern North Dakota (Sauer et al. 2004).

In Washington, Breeding Bird Survey (BBS) results indicate Western/Clark's grebes are most common in the Columbia River Basin in eastern Washington (Sauer et al. 2004). Known breeding locations of Western/Clark's grebes include Sprague Lake in Lincoln County; Moses Lake, Potholes Reservoir; and Lake Lenore in Grant County (Yocom et al. 1958). Many of these birds winter in the Puget Sound vicinity (Puget Sound Action Team 2005). A figure representing the distribution of Clark's grebes in Washington may be found in Appendix F.

3-14.4 Habitat Use

This species is generally considered absent from Washington during the non-breeding season (Yocom et al. 1958). Although molt locations are generally larger bodies of water than those used for nesting, they may be within the species breeding range, winter range or both (Stout and Cooke 2003).

NESTING

Western/Clark's grebes build floating nests in or near open water and utilize nearby emergent vegetation for nest materials (Lindvall and Low 1982). Nests may also occur in emergent vegetation or on dry land, but are usually within less than 1 meter of open water and other grebe nests (Nero et al. 1958; Lindvall and Low 1982). Ratti (1979) described Western grebe nest colonies in Utah and California as "partly segregated," in that light- and dark-phase grebes were not randomly distributed throughout the colony, yet they nested sympatrically. Nuechterlein (1981) confirmed these observations for breeding populations in Manitoba, Oregon and California, with Dickerman (1973) also providing evidence of spatial segregation in light- and dark-phase Western grebes breeding in Mexico. Little is known about age of maturity and fledgling success.

FORAGING

Based on observations of diving behavior, Nuechterlein (1981) indicated that light-phase Western grebes (i.e., *A. clarkii*) may forage farther from shore and at greater depths than dark-phase grebes. Ratti (1985), with Nuechterlein and Buitron (1989) providing additional evidence. However, Ratti (1985) also noted that distance from shore did not always correspond to greater depths, especially in artificial impoundments. At two natural lakes (Upper Klamath Lake and Lake Ewauna) in Oregon, Clark's grebes forage more frequently in areas of greater depths than Westerns, but it is not known whether they actually dive to greater depths than Westerns (Nuechterlein and Buitron 1989).

MIGRATION

While little is known about the migration of Western/Clark's grebes, migratory habitat most likely overlaps breeding habitat.

3-14.5 Population Trends:

Although little is known about population trends, analysis of BBS data for Western/Clark’s grebes indicates a significant, slightly positive increase (0.9 percent) in the Western Region between 1966 and 2003 (Sauer et al. 2004). These data also suggest the period of greatest increase was 1980 to 2003, although this trend is not significant (Sauer et al. 2004). In Washington, available BBS data point toward a declining trend, but these data are unreliable because of a low number of routes (Sauer et al. 2004). Winter population counts around Puget Sound indicate dramatic decreases in western grebes since 1992 (Puget Sound Action Team 2005).

3-14.6 Species Coverage Recommendation and Justification

It is recommended that Clark’s grebe be considered a **Watch-list Species** for the following reasons: 1) The species is not federally listed; 2) Washington DNR authorized activities have a “low” potential to affect Clark’s grebe; and 3) Information on population and habitat use for Clark’s grebe (as well as for the Western grebe) is insufficient to assess impacts and to develop conservation measures.

3-14.7 References

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3-15 Peregrine Falcon

3-15.1 Species name

Falco peregrinus

Common Name: Peregrine falcon

Subspecies names:

American peregrine falcon (*F. p. anatum*)

Arctic peregrine falcon (*F. p. tundrius*)

Peale's peregrine falcon (*F. p. pealei*)

Initial coverage recommendation: Covered

3-15.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS (US FISH AND WILDLIFE SERVICE)

Sub-species	Status
F. p. anatum	Delisted taxon, Recovered, Being monitored first 5 years
F. p. tundrius	Delisted taxon, Recovered
F. p. pealei	Not listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Sensitive Species (*F. peregrinus*)

NATURAL HERITAGE PROGRAM GLOBAL RANK

Sub-species	Status
F. p. anatum	G4T3
F. p. tundrius	G4T3T4
F. p. pealei	G4T3

NATURAL HERITAGE PROGRAM STATE RANK

Sub-species	Status
F. p. anatum	S1B, S3N
F. p. tundrius	SZN
F. p. pealei:	S2B, S3N

3-15.3 Range

Historically, North American populations of the peregrine falcon were widespread and bred from Banks Island and the Labrador Coast in Canada, south to central Mexico (Johnsgard 1990; Sibley 2000). However, the peregrine was extirpated from much of its former North American breeding range between 1940 and 1970 (Johnsgard 1990).

In Washington, the peregrine's breeding range is primarily west of the Cascade Mountains, with the greatest number of nest sites in the San Juan Islands, Puget Sound lowlands and along the outer northern coast of western Washington (Johnsgard 1990; Hayes and Buchanan 2002) (Appendix F). They also nest on forested slopes of the Cascade Mountains and in the Columbia River Gorge, usually within close proximity to large lakes or river valleys (Hayes and Buchanan 2002; Sergio et al. 2004) (Appendix F).

At this time, both American and Peale's peregrines are considered to breed in western Washington, although the amount of overlap in each subspecies' breeding range remains relatively unknown (Hayes and Buchanan 2002). Peale's peregrine was found mainly along the Pacific Coast; however, recent reintroductions of birds with Peale's characteristics have made it more widespread (Sibley 2000). Conversely, only American peregrines have been known to breed east of the Cascade Mountains, where the number of nest sites is substantially less than that in western Washington (Hayes and Buchanan 2002).

Winter ranges of peregrines in Washington are similar to their breeding ranges. In western Washington, peregrines often winter at locations such as Puget Sound estuaries, Grays Harbor, Willapa Bay, Columbia River estuary, outer coastal beaches, low-lying agricultural lands and some urban areas (Hayes and Buchanan 2002). Both American and Peale's peregrines winter in these areas during the winter (Hayes and Buchanan 2002), with the American peregrine also found in widely scattered localities in eastern Washington (Hayes and Buchanan 2002). The arctic peregrine is considered a migrant in Washington and may be an extremely rare winter resident (Hayes and Buchanan 2002).

3-15.4 Habitat Use

NESTING

Nests are typically constructed on prominent cliffs that provide an unobstructed view of the surrounding landscape, protection from the elements and limited access by mammalian predators (Johnsgard 1990). These sites, known as eyries, are usually located within close proximity to water (e.g., lakes, marshes, river valleys and ocean beaches), and most likely are associated with a prey base of smaller birds (Johnsgard 1990; Hayes and Buchanan 2002; Sergio et al. 2004). Peregrines may also use smaller cliffs and cut-banks, but these are considered lower-quality sites (Beebe 1960; Johnsgard 1990). Peregrine falcons may breed during their second year of life, but the age of first breeding is influenced by the availability of territories (White et al. 2002). Clutch size is typically three to four eggs, and fledging success has increased to one to two annually per nest since the 1980’s as the population recovered from the effects of pesticides (White et al. 2002).

NON-BREEDING

Habitats used by peregrines during the non-breeding season are typically open areas that often support high densities of small- to medium-sized birds, such as shorebirds and waterfowl (Johnsgard 1990; Kaufman 1996; White et al. 2002). In western Washington, these areas may include coastal and estuarine habitats (e.g., beaches, tidal flats, islands and marshes), open ocean, agricultural fields, airports and urbanized areas where rock pigeons (*Columba livia*), a primary prey species, are abundant (Hayes and Buchanan 2002). The availability of perch and roost sites are also important winter-habitat requirements; however, these aspects have not been well-studied.

In Washington, a variety of artificial and natural perches are used, and selection of these sites is most likely related to proximity to foraging habitat (Hayes and Buchanan 2002). Although habitat requirements of peregrines wintering in eastern Washington have not been well-studied, it is likely they have similar habitat requirements as do peregrines in western Washington.

Discernable migration routes are evident in western Washington, and spring migrants often stage at Grays Harbor, Willapa Bay and numerous estuaries and associated habitats in Puget Sound, and autumn migration primarily along the outer coast and the Puget Sound basin (Hayes and Buchanan 2002). Limited data also suggest that migrants traveling through eastern Washington may follow a corridor along the Columbia River in Benton, Douglas, Grant and Walla Walla counties, with an increasing number of sightings in recent years (Hayes and Buchanan 2002). Knowledge of subspecies-specific movements on the west coast is limited; however, there is significant band-return data that suggest most peregrines migrating along the outer coast of Washington are Peale’s falcons (Hayes and Buchanan 2002).

3-15.5 Population Trends

Peregrine populations were believed to have declined in the Pacific Northwest as early as the 1930s and 1940s, reaching their lowest levels during the 1950s (Hayes and Buchanan 2002). The decline was primarily attributed to widespread contamination of organochlorine pesticides, which caused eggshell thinning and reduced productivity (White et al. 1973; Schick et al. 1987; Johnsgard 1990; Jarman et al. 1993; Henny et al. 1996; Johnstone et al. 1996; White et al. 2002). Following the ban of dichlorodiphenyltrichloroethane (DDT) in 1972 and the listing of peregrines as an Endangered Species in 1973, a network of captive breeding programs was initiated to help boost remaining populations (Hayes and Buchanan 2002). In Washington, captive-bred American peregrines were released from 1982 to 1997 (Hayes and Buchanan 2002). Population-trend information based on annual surveys during 1980 to 2001 indicates a steady increase (approximately 14 percent) in Washington (Wilson et al. 2000; Hayes and Buchanan 2002). By the mid-1990s, peregrine populations had reached recovery goals (White et al. 2002) and were subsequently delisted in August 1999 (64 Code of Federal regulations Part 164, 1999).

3-15.6 Species Coverage Recommendation and Justification

It is recommended that the peregrine falcon be addressed as a **Watch-list species** because: 1) The species is not federally listed; 2) There is "medium" potential for impacts resulting from Washington DNR authorized activities; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

3-15.7 References

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3-16 Purple Martin

3-16.1 Species Name

Progne subis

Common Name: Purple martin

Initial coverage recommendation: Covered

3-16.2 Status and Rank

See glossary for listing and ranking definitions and criteria.

FEDERAL STATUS

Not listed

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE STATUS

Candidate

NATURAL HERITAGE PROGRAM GLOBAL RANK

G5

NATURAL HERITAGE PROGRAM STATE RANK

S3B, SZN

3-16.3 Range

The breeding range of the purple martin extends from the south-central and southeastern Canadian provinces into northern and central Mexico. In the United States, the species breeds south of the Canadian border and mainly east of the Rocky Mountains to southern Texas, the Gulf Coast and southern Florida. Purple martins do occur in western North America, mostly in the Upper Sonoran through Transition zones. Distribution is patchy and local in the United States west of 102nd parallel and east of the Cascade and Sierra Nevada mountains, except in the mountains of south-central and western New Mexico, portions of southern and northwest Arizona, western Colorado, north-central Utah, Klamath County, Oregon, and along eastern slopes of Cascade Mountains of California. Purple martins breed locally west of the Cascade and Sierra Nevada mountains from extreme southwest British Columbia south to extreme southwestern California. The species winters in the lowlands of South America (Columbia, Venezuela, Guiana, Surinam, northern Bolivia and Brazil) (De Tarso Zuquim Antas et al. 1986; Brown 1997).

In Washington, the purple martin breeds locally west of the Cascade Mountains (Brown 1997) near water around Puget Sound and the Columbia River. As of 1990, breeding pairs had been confirmed in San Juan, King, Pierce, Thurston, Mason, Clark, Skamania and Gray’s Harbor counties (Washington Fish and Wildlife 1990). A figure representing the distribution of the purple martin in Washington may be found in Appendix F.

3-16.4 Habitat Use

The purple martin is an insectivorous aerial forager, often at altitudes of at least 50 meters (Johnston and Hardy 1962), typically over open fields and waterways (Brown 1997).

NESTING

Although distribution was likely patchy and localized, purple martin populations historically inhabited forest edge and riparian areas. Purple martins in the western United States preferentially inhabit montane forest or Pacific lowlands (Brown 1997). They frequently nest solitarily, restricted to areas with natural cavities (Richmond 1953; Stutchbury 1991; Brown 1997), avoiding deserts and grasslands (Brown 1997). The species’ apparent absence from many areas in the northern Rockies, intermountain region, California, Pacific Northwest and Mexican highlands may mean that the species has more specific habitat requirements in these areas that are unknown (Brown 1997).

In Washington, most of the reported martin nests were in manmade structures near cities and towns in west-side lowlands (Washington Fish and Wildlife1990) Those that do nest in cavities use those located in old pilings and occasionally in snags with clear air space and easy access (Washington Fish and Wildlife 1990).

Purple martins are mature and will nest during their second year of life, typically laying three to six eggs. Fledging success is typically two to four young annually (Brown 1997).

WINTERING

Purple martins of all ages flock to roosts before fall departure (Mitchell 1947; Morton and Patterson 1983; Brown 1997). Roosts are usually in stands of trees or underneath concrete bridges (Hill 1948; Brown 1997). In the eastern United States, most pre-migratory roosts were clearly associated with large bodies of water, such as lakes and rivers (Russell et al. 1998). Fall migration from its breeding range in North America to its winter range in South America occurs via Mexico and the Central American isthmus. Purple Martins are exclusively diurnal migrants, foraging as they move (Brown 1997). They migrate over the Gulf of Mexico and closer to beaches than other swallows and apparently avoid the highlands, at least in Mexico and Central America. In southern Brazil, the purple martin occupies largely savanna and agricultural areas, feeding widely during day and flocking into large roosts in cities and towns at night. Roosts are often located in trees in village plazas (Brown 1997).

3-16.5 Population Trends

The North American Breeding Bird Survey (BBS) index indicates steady or slightly increasing populations in the Pacific Northwest, the western BBS region and over the entire United States (Sauer et al. 2004). The reversing of previously reported purple martin population declines may be the result of artificial nesting structures (Brown 1997).

3-16.6 Species Coverage Recommendation and Justification

It is recommended that the purple martin be addressed as a **Watch-list Species** because: 1) The species is not federally listed; 2) The potential for impacts from Washington DNR authorized activities is "low"; and 3) Sufficient information is available to assess impacts and to develop conservation measures.

3-16.7 References

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